50 SERIES
CONFIGURATION GUIDE

FOR INTERNAL USE ONLY
SOU-2101-010

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Technical Communications
Prime Park, MS 15-13
Natick, MA 01760

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PREFACE

This document provides comprehensive and accurate configuration information regarding all of Prime's current systems. It is a companion document to the Prime Hardware and Software U.S. Price Book (SOU-2102-009), which includes additional information regarding Product Numbers, Pricing, Prerequisites and Descriptions.

Note that configuration information for all communications hardware and software products has been incorporated into a separate section. (Section 4). IT IS MANDATORY THAT THIS SECTION BE REFERENCED FOR PROPER CONFIGURATION INFORMATION.

Comments and suggestions aimed at correcting and improving the Configuration Guide are solicited.

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COMMONLY USED ABBREVIATIONS

AC	Alternating Current
AMLC	Asynchronous Multi-Line Controller
amp	Amperes
BPI	Bits per inch
BTU	British Thermal Units
C	Centigrade
CMD	Cartridge module disk
cm	Centimeters
CPS	Characters per second
CPU	Central processing unit
CRT	Cathode ray tube
DDS	Digital data service
DPTX	Distributed Processing Terminal Executive
DSC	Data stream editor
EIA	Electronic Industries Association
ECC	Error correcting
EDP	Electronic data processing
F	Fahrenheit
FCC	Federal Communications Commission
FED	FORMS Editor
FTS	File Transfer Service
ft	Feet
FMD	Fixed media disk
GCR	Group coded recording
HDLC	High Level Data Link Control
HDX	Half duplex
HSSDMLC	High Speed Synchronous Multi-Line Controller
Hz	Hertz
ICS1	Intelligent Communications Subsystem, Model I
ICS2	Intelligent Communications Subsystem, Model II
I/O	Input/output
in	Inches
IPS	Inches per second
IPCF	Inter-program Communications Facility
KB	Kilobytes
KVA	Kilovolt amps
lbs	Pounds
LED	Light emitting diode
LPM	Lines per minute
LP	Line printer
ma	milliampere
MB	Megabytes
MDLC	Multi-Line Data Link Controller
MTT	Magnetic Tape Transport
MOS	Metallic oxide semiconductor
msec	Millisecond

PMN	Prime Marketing Notice
PNC	PRIMENET Node Controller
PPA	Prime Product Announcement
PROM	Programmable read only memory
RAM	Random access memory
RJE	Remote job entry
ROM	Read only memory
sec	Seconds
SMD	Storage module disk
SSU	Stream synchronization unit
TCF	Transparent connect facility
TSF	Terminal support facility
URC	Unit record controller
V	Volts
VAC	Volts Alternating Current
VCP	Virtual Control Panel

SECTION 1

CENTRAL SYSTEMS

2250 SYSTEM

There are several system packages for the 2250. Each contains the 2250 CPU; however, they differ in their memory, disk and tape configurations. All 2250 systems include one ICS1 communications controller. For proper configuration information on all hardware and software communications products, please refer to Section 4.

Hardware and Software Supplied

Standard system hardware components included in all basic 2250 systems are as follows:

- 2250 Central Processor
- PRIMOS Operating System (Rev. 19.1 or greater)
- Memory Boards (1/2MB, 1MB or 2MB)
- Diagnostic Processor with Cable
- ICS1 Communications Controller, supporting eight asynchronous lines and one synchronous line
- Intelligent Disk/Tape Controller, capable of supporting up to four disk drives and two cartridge tape drives, or 4005 support for up to two 315MB disk drives
- One 68MB, 158MB or 315MB Winchester Disk
- 15MB Cartridge Tape Drive or Streaming Magnetic Tape Drive
- 120 amp Power Supply
- 2250 System Cabinet, Chassis, Fans, Control Panel and Power Distribution Unit

Optional Hardware and Software

Optional hardware on the 2250 system includes communications subsystems, disk subsystems, tape subsystems, unit record controller, peripherals and add-on MOS memory. Any Prime standard software may also be ordered.

Communications Subsystem Options

One ICS1 communications controller is supplied with the basic 2250, allowing the capability of eight asynchronous lines and one synchronous line. This capability is expandable to a maximum configuration of up to 32 asynchronous and two synchronous lines, using two ICS1 controllers and one 16-line AMLC or the ICS2/3. The ICS1 is required on 2250 systems because it contains the hardware logic for I/O bus parity checking. An ICS3 Model 5725 is available for 2250 users requiring PRIME/SNA. Refer to Section 4 for detailed communication configuration information.

Disk Subsystem Options

The 2250 has two types of Winchester disk controllers: one for the 68MB/158MB disk drives (unformatted) and the other for the 315MB disk drives (unformatted). A 2250 system supports up to four of the 68MB/158MB drives in any mix, and without any additional controllers. A single 2250 package system (Model 2250-019) will support up to two 315MB (unformatted) disk drives. This package will not support the cartridge tape drive or the 68MB/158MB disk drives.

Magnetic Tape Subsystem Options

All 2250 packages include either a 15MB cartridge tape or streaming magnetic tape drive. The cartridge drives are mounted in the 2250 system cabinet. Streaming tape drives are mounted in a separate cabinet.

Unit Record Subsystem Options

Unit Record Subsystems support up to two line printers and a card reader. The 2250 can support up to two Unit Record Subsystems. More information concerning Unit Record Subsystems is found in Section 2.

Main Memory

Three basic memory configurations of 1/2MB, 1MB and 2MB are packaged with the system. Additional memory may be added, to a maximumof 4MB. The following memory types are possible in legal 2250 configurations: MMW1-HMB (1/2MB E7), MMW1-1MB (1MB E8), MMW1-E9 (1MB E9), MMW1-2MB (2MB), and MMW1-4MB (4MB).

Additional Options

The 2250 is available with a desktop, providing a work surface for the operator/user.

A power conditioning unit may also be ordered for the 2250. This unit, which acts as an AC line filter for the system, is useful where the power is subject to transient noise.

System Specifications

Please refer to Appendix A for 2250 system specifications.

Configuration Limitations

The 2250 has one 10-slot chassis and a 120 amp power supply. Unlike other systems, the limitation is slots, not power. The two-board CPU uses a total of three slots, because one slot between the CPU boards must remain open to allow for adequate airflow/cooling. Memory boards also have specific slot requirements, which are detailed later in this section.

The boards listed below must be ordered on a 2250 configuration:

Board Name	# of Slots	
CPU	3	
1/2MB OR	2	(1 slot open - see explanation below)
2-Board Memory Packages OR	2	
1MB E9 Memory Board	1	
Disk/Tape Controller	1	
Systems with Streaming Tape	1	
ICS1 Communications Controller	1	

1MB 2250 system packages currently ship with E9 memory boards only. Special attention must be paid when configuring memory on a 2250.

The 1/2MB board on the 2250 must be configured in pairs, or when configured with one board, the slot next to it must remain open (except as noted below). The necessity of the pairs or an open slot lies in the present design of the 2250 memory boards up through E8; a board will always seek its pair or an open slot next to it in order to operate. All add-on memory boards for the 2250 include either the MMW1-E9, MMW1-2MB or MMW1-4MB, with self-interleaving capability.

There are 10 chassis slots in the 2250 system. To determine the number of chassis slots available for expansion, subtract the number of slots consumed by your system configuration according to the chart above. The Diagnostic Processor on the 2250 does not require a chassis slot.

2350 SYSTEM

There are three base system packages for the 2350. One model (Product Number 2350-011) contains a 60MB Winchester disk subsystem. The other models (Product Numbers 2350-021 and 2350-031) contain a 120MB Winchester disk subsystem. These models also differ, in that they contain a 4MB memory board in the base system, instead of a 2MB board.

For detailed configuration information on all hardware and software communications products, please refer to Section 4.

Hardware and Software Supplied

Standard system hardware components included in the base 2350-011 system are as follows:

- 2350 Central Processor
- PT200 System Console
- PRIMOS Operating System (Execute-Only, Rev. 20.0 or greater)
- Memory Board (Single 2MB EE board)
- Diagnostic Processor with Cable
- ICS1 Communications Controller, supporting eight asynchronous lines and one synchronous line
- Combined Disk/Tape Controller
- One 60MB Winchester Disk Drive
- 60MB Cartridge Tape Drive
- 130 amp Power Supply
- 2350 System Cabinet, Chassis, Fan, Integral Modem (60Hz units), Control Panel and Power Distribution Unit

Standard system hardware components included in the base 2350-021 system are as follows:

- 2350 Central Processor
- PT200 System Console
- PRIMOS Operating System (Execute-Only, Rev. 20.0 or greater)
- Memory Board (Single 4MB EE board)
- Diagnostic Processor with Cable
- AMLC Communications Controller, supporting 16 asynchronous lines
- Combined Disk/Tape Controller
- One 120MB Winchester Disk Drive
- 60MB Cartridge Tape Drive
- 130 amp Power Supply
- 2350 System Cabinet, Chassis, Fan, Integral Modem (60Hz units), Control Panel and Power Distribution Unit

Standard system hardware components included in the base 2350-031 system are as follows:

- 2350 Central Processor
- PT200 System Console
- PRIMOS Operating System (Execute-Only, Rev. 20.1 or greater)
- Memory Board (Single EE 4MB board)
- Diagnostic Processor with Cable
- ICS3 Communications Controller, Supporting 4 asynchronous lines
- Combined Disk/Tape Controller
- One 120MB Winchester Disk Drive
- 60MB Cartridge Tape Drive
- 130 amp Power Supply
- 2350 System Cabinet, Chassis, Fan, Integral Modem (60Hz units), Control Panel and Power Distribution Unit.

NOTE: The international versions of the 2350 system packages do not contain PT200 system consoles. 50Hz versions do not include power cords. The 2350 international packages can be ordered under the following model numbers:

Model Number	Description
2350-010	2350-011 System Components, 60Hz Countries
2350-010-A	2350-011 System Components, 50Hz Countries
2350-020	2350-021 System Components, 60Hz Countries
2350-020-A	2350-021 System Components, 50Hz Countries
2350-030	2350-031 System Components, 60Hz Countries
2350-030-A	2350-031 System Components, 50Hz Countries

Optional Hardware and Software

All allowed optional hardware and software is listed below:

- ICS1
- ICS3
- 2MB EE Memory
- 4MB EE Memory
- 60MB Disk Drive
- 120MB Winchester Disk Drive
- PRIMENET Node Controller II (PNC II)
- Streaming Magnetic Tape Drive with peripheral cabinet
- Multi Data Link Controller with Protocol options
- Power Conditioning Unit
- Blank Cartridges for the 60MB Cartridge Tape Drive
- Peripherals (printers, terminals, etc.) that can attach to the 2350 communications lines
- Any Prime standard software may also be ordered

Communications Subsystem Options

The 2350 system can be configured with up to 32 async lines and up to 4 sync lines. The 32 async line maximum can be reached only through the following option combinations:

- ICS3 with (8) CLAC304s
- ICS3 with (6) CLAC304s and (1) ICS1
- ICS3 with (6) CLAC304s and (1) AMLC, with up to 8 lines on the AMLC connected
- (1) AMLC and (1) ICS1

The 4 sync line maximum can be reached only through the following option combinations:

- (2) MDLCs
- ICS3 with (2) CLAC602 or (2) CLAC622s

Refer to Section 4 for detailed information on Communications Subsystems configurations.

Disk Subsystem Options

The 2350-011 system has one 60MB disk drive imbedded in its system cabinet, and can support up to a total of two disk drives. A second 60MB disk drive or a 120MB disk drive may be added into the system cabinet without any additional controllers.

The 2350-021 and 2350-031 systems each have one 120MB disk drive imbedded in their system cabinets, and can support up to a total of two disk drives. A second 120MB disk drive or a 60MB disk drive may be added into the system cabinet without any additional controllers.

Magnetic Tape Subsystem Options

All 2350 systems include a 60MB, 5.25-inch Cartridge Tape Drive. A Streaming Magnetic Tape Drive (Model Number 4660T) may be added as an option to this base system. This requires the installation of an additional controller, and entails the use of a separate peripheral cabinet where the Streamer is mounted.

Main Memory

The base 2350-011 system includes 2MB of memory on a single board. The base 2350-021 and 2350-031 systems include 4MB of memory on a single board. Additional memory may be added to a limit of 8MB. The following memory boards are supported: MMW1-2MT (2MB) or MMW1-4MT (4MB).

Additional Options

The 2350 is available with a power conditioning unit. This unit acts as an AC line filter for the system, and is useful where the power is subject to transient noise.

System Specifications

Please refer to Appendix A for 2350 system specifications.

Configuration Limitations

The 2350 has one 9-slot chassis and a 130 amp power supply. Unlike other Prime systems, the limitation is in slots, not power. The two-board CPU uses a total of three slots, because one slot between the CPU boards must remain open to allow for adequate airflow/cooling. Memory boards also have specific slot requirements, which are detailed later in this section.

The boards listed below come standard with every 2350:

Board Name	# of Slots
CPU	3
Diagnostic Processor	1
2MB or 4MB Memory Board	1
Disk/Tape Controller	1
ICS1 or AMLC Communications Controller	1
Total	7

This configuration leaves two slots which may be configured with any supported controller or memory. The 2MB and 4MB boards may be placed in these two available option slots, as long as total system memory does not exceed 8MB. In cases where a system becomes slot constrained, the 2MB memory board that comes standard with the 2350-011 system may be replaced with a 4MB memory board. 2MB memory, residing in one of the option slots, may also be replaced with 4MB memory boards, as long as the user is slot constrained, and the total system memory does not exceed 8MB. Refer to the U.S. Price Book (SOU-2102-009) for memory trade-in policies.

2450 SYSTEM

There are three system packages for the 2450. One model (Product Number 2450-011) contains a 60MB Winchester disk subsystem. The other models (Product Numbers 2450-021 and 2450-031) contain a 120MB Winchester disk subsystem. These models are also different in that they contain a 4MB memory board in the base system, instead of a 2MB board.

For detailed configuration information on all hardware and software communications products, please refer to Section 4.

Hardware and Software Supplied

Standard system hardware components included in the base 2450-011 system are as follows:

- 2450 Central Processor
- PT200 System Console
- PRIMOS Operating System (Execute-Only, Rev. 20.0 or greater)
- Memory Board (Single 2MB EE board)
- Diagnostic Processor with Cable
- AMLC Communications Controller, supporting 16 asynchronous lines
- Combined Disk/Tape Controller
- One 60MB Winchester Disk Drive
- 60MB Cartridge Tape Drive
- 130 amp Power Supply
- 2450 System Cabinet, Chassis, Fans, Integral Modem (60Hz units), Control Panel and Power Distribution Unit

NOTE: The 2450-011 system package has been removed from the price book and is no longer available.

Standard system hardware components included in the base 2450-021 system are as follows:

- 2450 Central Processor
- PT200 System Console
- PRIMOS Operating System (Execute-Only, Rev. 20.0 or greater)
- Memory Board (Single 4MB EE board)
- Diagnostic Processor with Cable
- AMLC Communications Controller, supporting 16 asynchronous lines
- Combined Disk/Tape Controller
- One 120MB Winchester Disk Drive
- 60MB Cartridge Tape Drive
- 130 amp Power Supply
- 2450 System Cabinet, Chassis, Fans, Integral Model (60Hz units), Control Panel and Power Distribution Unit

Standard system hardware components included in the base 2450-031 system are as follows:

- 2450 Central Processor
- PT200 System Console
- PRIMOS Operating System (Execute-Only, Rev. 20.1 or greater)
- Memory Board (Single 4MB board)
- Diagnostic Processor with Cable
- ICS3 Communications Controller, supporting 4 asynchronous lines
- Combined Disk/Tape Controller
- One 120MB Winchester Disk Drive
- 60MB Cartridge Tape Drive
- 130 amp Power Supply
- 2450 System Cabinet, Chassis, Fan, Integral Modem (60Hz units), Control Panel and Power Distribution Unit

NOTE: The international versions of the 2450 system packages do not contain PT200 system consoles. 50Hz versions do not include power cords. The 2450 international packages can be ordered under the following model numbers:

Model Number	Description
2450-010*	2450-011 System Components, 60Hz Countries
2450-010-A*	2450-011 System Components, 50Hz Countries
2450-020	2450-021 System Components, 60Hz Countries
2450-020-A	2450-021 System Components, 50Hz Countries
2450-030	2450-031 System Components, 60Hz Countries
2450-030-A	2450-031 System Components, 50Hz Countries

* The 2450-010 system packages have been removed from the price book and are no longer available.

Optional Hardware and Software

The following is a list of all allowed optional hardware and software:

- ICS1
- ICS3
- 2MB EE Memory
- 4MB EE Memory
- 60MB Disk Drive
- 120MB Winchester Disk Drive
- PRIMENET Node Controller II (PNC II)
- Streaming Magnetic Tape Drive with Peripheral Cabinet
- Multi Data Link Controller with Protocols
- Power Conditioning Unit
- Blank Cartridges for the 60MB Cartridge Tape Drive
- Peripherals (printers, terminals, etc.) that can attach to the 2450 communications lines
- Any Prime standard software may also be ordered

Communications Subsystem Options

The 2450 System can be configured with up to 40 async lines and up to four sync lines. The 40 async line maximum can be reached only through the following option combinations:

- ICS3 with (8) CLAC304s and (1) ICS1
- ICS3 with (8) CLAC304s and (1) AMLC, with up to 8 lines on the AMLC connected

The four sync line maximum can be reached only through the followign option combinations:

- (2) MDLCs
- ICS3 with (2) CLAC602s or (2) CLAC622s

Refer to Section 4 for detailed information on Communications Subsystem configurations.

Disk Subsystem Options

The 2450-011 system has one 60MB disk drive imbedded in its system cabinet, and can support up to a total of two disk drives. A second 60MB disk drive or a 120MB disk drive may be added into the system cabinet without any additional controllers.

The 2450-021 and 2450-031 systems each have one 120MB disk drive imbedded in their system cabinets, and can support up to a total of two disk drives. A second 120MB disk drive or a 60MB disk drive may be added into the system cabinet without any additional controllers.

Magnetic Tape Subsystem Options

All 2450 systems include a 60MB, 5.25-inch cartridge tape drive. A Streaming Magnetic Tape Drive (Model Number 4660T) may be added as an option to this base system. This requires the installation of an additional controller and entails the use of a separate peripheral cabinet where the Streamer is mounted.

Main Memory

The base 2450-021 and 2450-031 systems include 4MB of memory on a single board. Additional memory may be added to a limit of 8MB. The following memory boards are supported: MMW1-2MT (2MB) or MMW1-4MT (4MB).

Additional Options

The 2450 is available with a power conditioning unit. This unit acts as an AC line filter for the system, and is useful where the power is subject to transient noise.

System Specifications

Please refer to Appendix A for 2450 system specifications.

Configuration Limitations

The 2450 has one 9-slot chassis and a 130 amp power supply. Unlike other Prime systems, the configuration limitation is in slots, not power. The two-board CPU uses a total of three slots, because one slot between the CPU boards must remain open to allow for adequate airflow/cooling. Memory boards also have specific slot requirements, which are detailed later in this section.

The boards listed below come standard with every 2450 system:

Board Name	# of Slots
CPU	3
Diagnostic Processor	1
2MB or 4MB Memory Board	1
Disk/Tape Controller	1
AMLC Communications Controller	1
Total:	7

This configuration leaves two open slots which may be configured with any supported controller or memory. The 2MB and 4MB memory boards may be placed in these two available option slots, as long as total system memory does not exceed 8MB. In cases where a system becomes slot constrained, the 2MB memory board that comes standard with the 2450-011 system may be replaced with a 4MB memory board. 2MB memory residing in one of the option slots may also be replaced with 4MB memory boards, as long as the user is slot constrained and total system memory does not exceed 8MB. Refer to the U.S. Price Book (SOU-2102-009) for memory trade-in policies.

2655 SYSTEM

There are several system packages for the 2655. Each contains the 2655 CPU; however, they differ in their memory, disk and tape configurations.

For proper configuration information on all hardware and software communications products, please refer to Section 4.

Hardware and Software Supplied

Standard system components that are included in all of the basic 2655 systems are as follows:

- 2655 Central Processor
- PRIMOS Operating System (Rev. 19.4.3 or greater)
- Memory Boards (One 4MB board)
- Diagnostic Processor with Cable and Modem (60Hz only)
- 130 amp Power Supply
- Office Systems Cabinet, Chassis, Fans, Control Panel and Power Distribution Unit

Optional Hardware and Software

Optional hardware on the 2655 includes communications subsystems, disk subsystems, tape subsystems, unit record controllers, peripherals and add-on MOS memory. Any Prime standard software may also be ordered.

Communications Subsystem Options

Included with the 2655 system is bulkhead support for 32 asynchronous and four synchronous lines. A maximum of 64 asynchronous lines may be connected; however, additional communications hardware must be configured. For proper configuration information, please refer to Section 4.

Disk Subsystem Options

The 2655 supports the 315MB FMD and the 496MB FMD in the 2655 office peripheral cabinet, as well as the full range of disk subsystems Prime offers for the computer room. A maximum of two disk subsystems, or a total of six drives, is allowed.

Magnetic Tape Subsystem Options

Some 2655 system packages include a Magnetic Tape Subsystem. All of Prime's tape subsystems are supported by the 2655. The 2655 can support one streaming tape controller and two tape drives per subsystem. The system will only support one cartridge tape subsystem and one cartridge tape drive per subsystem in the office environment.

Unit Record Subsystem Options

Unit Record Subsystems support a maximum of two line printers and a card reader. The 2655 supports a maximum of two unit record subsystems. Refer to Section 2 for additional information.

Main Memory

The 2655 comes with 4MB of main memory in the form of a single 4MB board. A maximum of 8MB of main memory is supported.

Additional Options

An optional power conditioning unit is available for the 2655. (Order Product Number 7562L for the system cabinet and 7563L for the office peripheral cabinet.) This unit, which acts as an AC line filter, is useful where the power is subject to transient noise.

NOTE: The 2655 is not available with a desktop.

System Specifications

Please refer to Appendix A for 2655 system specifications.

Configuration Limitations

The 2655 has one 16-slot chassis, powered by a single 130 amp power supply, with a maximum of 8MB of allowable memory. The chassis houses the 2655 CPU, memory and I/O controllers. The amperage draw for the system CPU, memory boards and I/O controllers may not exceed 130 amps; thus, the TOTAL amperager draw must be considered when configuring the available seven (7) slots for I/O controllers.

BOARD	ESTIMATED AMPERAGE
Standard System:	
CPU (A + B boards)	44.3
Options:	
1024KB memory (MMW1-E9)	5.7
2048KB memory (MMW1-2MB)	5.5
4096KB memory (MMW1-4MB)	6.4
MDLC - 2 lines	11.1
MDLC - 4 lines	11.5
Tape Controller (4520F/4522F)	19.3
Streamer Controller	6.9
Unit Record Controller	10.3
Systems Options Controller	7.8
PRIMENET Node Controller II (PNC II)	12.7
AMLC	8.6
ICS1	6.7
ICS2	12.8
ICS3	12.8
Disk Controller (4005)	10.2
Disk Controller (6580)	13.0
Cartridge Tape Controller	
Disk/Tape	13.8
Tape Only	4.2

9655 SYSTEM

There are several system packages for the 9655. Each contains the 9655 CPU; however, they differ in their memory, disk and tape configurations.

For proper configuration information on all hardware and software communications products, please refer to Section 4.

Hardware and Software Supplied

Standard system components included in all basic 9655 systems are as follows:

- 9655 Central Processor
- PRIMOS Operating System (Rev. 19.4.3 or greater)
- Memory Boards (One 4MB memory board is included with each system)
- Diagnostic Processor with Cables and Modem (60Hz only)
- Single-Bay Computer Room Cabinet and Chassis
- One 130 amp Power Supply for CPU and Memory Chassis
- One 130 amp Power Supply for I/O Chassis
- Disk Subsystem (300MB, 315MB, 496MB or 675MB)

Optional Hardware and Software

Optional hardware available with the 9655 system includes communications subsystems, disk subsystems, tape subsystems, unit record subsystems, peripherals and add-on memory boards. Any Prime standard software may also be ordered with the 9655 system.

Communications Subsystem Options

The 9655 includes bulkhead support for 64 asynchronous and eight syncronous lines. A maximum of 128 asyncronous lines may be connected; however, additional communications hardware must be configured. For the proper configuration of all communications capabilities, please refer to Section 4.

Disk Subsystem Options

Any Prime disk subsystem, except the 60MB (used with the 2350 and 2450 systems) and the 68MB/158MB (used with the 2250), may be installed with the 9655. The first packaged disk subsystem includes a controller, cable and disk. A peripheral cabinet is also included with rack-mounted devices. Each controller supports a maximum of four disk drives of any variety. The 9655 system supports a maximum of four disk controllers, for a total of 16 drives with PRIMOS Rev. 19.4.3 or greater. See Section 2 for more information about disk subsystems.

Magnetic Tape Subsystem

Some packaged 9655 systems include a magnetic tape subsystem. All of Prime's tape subsystems may be used with the 9655. Support for a maximum of two tape subsystems and four tape drives per subsystem, or a total of eight drives, is provided.

Unit Record Subsystem Options

Unit Record Subsystems support a maximum of two line printers and a card reader. The 9655 supports a maximum of two unit record subsystems. More information on unit record subsystems is found in Section 2.

Main Memory

The minimum memory of 4MB is supplied on one 4MB board. Main memory can be expanded to a maximum of 8MB.

System Specifications

Please refer to Appendix A for 9655 system specifications.

Configuration Limitations

The 9655 CPU and memory use their own chassis and power supply and allow a maximum of 8MB of memory. The 9655 I/O chassis has one 130 amp power supply; thus the TOTAL amperage draw for CPU, memory boards and I/O controllers must be considered when configuring the available 10 chassis slots for I/O controllers.

BOARD	ESTIMATED AMPERAGE
MDLC - 2 lines	11.1
MDLC - 4 lines	11.5
Tape Controller (4502F/4522F)	19.3
GCR Tape Controller (4550/4590)	14.0
Streamer Controller	6.9
Unit Record Controller	10.3
Systems Options Controller	7.8
PRIMENET Node Controller II (PNC II)	12.7
AMLC	8.6
ICS1	6.7
ICS2	12.8
ICS3	12.8
Disk Controller (4005)	10.2
Disk Controller (6580)	13.0
Cartridge Tape Controller	
Disk/Tape	13.8
Tape Only	4.2

9755 SYSTEM

There are several system packages for the 9755. Each contains the 9755 CPU; however, they differ in memory, disk and tape configurations. For proper configuration information on all hardware and software communications products, please refer to Section 4.

Hardware and Software Supplied

Standard system components included in all basic 9755 systems are as follows:

- 9755 Central Processor
- PRIMOS Operating System (Execute-Only, Rev. 19.4.9)
- One 4MB Memory Board
- Diagnostic Processor with Cables and Modem (60Hz only)
- Twin-bay Computer Room Cabinet and Chassis
- One 130 amp Power Supply for the Memory Chassis
- One 130 amp Power Supply for the I/O Chassis
- CPU Chassis and Power Supply
- Disk Subsystem (300MB, 315MB, 496MB or 675MB)

Optional Hardware and Software

Optional hardware available with the 9755 includes communications subsystems, disk subsystems, tape subsystems, unit record subsystems, peripherals and add-on memory boards. Any Prime standard software may also be ordered with the 9755.

Communications Subsystem Options

Bulkhead support for 64 asynchronous and eight synchronous lines is included with the 9755. A maximum of 192 asynchronous lines may be connected; however, additional communications hardware must be configured. For the proper configuration of all communications products, please refer to Section 4.

Disk Subsystem Options

Any Prime disk subsystem, except the 60MB and 120MB (used with the 2350 and 2450 systems), and the 68MB/158MB (used with the 2250), may be installed with the 9755. The first packaged disk subsystem includes a controller, cable and disk. A peripheral cabinet is also included with rack-mounted devices. Each controller supports a maximum of four disk drives of any variety. Up to four disk controllers can be supported by each 9755, for a total of 16 disk drives. See Section 2 for more information concerning disk subsystems.

Magnetic Tape Subsystem Options

Some packaged 9755s include a magnetic tape subsystem. All of Prime's tape subsystems may be used with the 9755. A maximum of two tape subsystems and four tape drives per subsystem are supported, for a total of eight tape drives.

Unit Record Subsystem Options

The 9755 supports a maximum of two unit record subsystems, each supporting a maximum of two line printers and a card reader. More information on unit record subsystems is found in Section 2.

Main Memory

Minimum memory of 8MB is supplied by two 4MB boards. Memory can be expanded in 2MB, 4MB or 8MB increments, to a maximum of 16MB of main memory. The ECL memory boards are self-interleaved; i.e., there is no performance advantage utilizing pairs of boards.

System Specifications

Cabinet dimensions and configuration guidelines are covered in greater detail in Section 5 - Cabinet Configuration Requirements. Please refer to Appendix A for 9755 system specifications.

Configuration Limitations

The 9755 CPU and memory use their own chassis and power supplies, and allow a maximum of 16MB or memory. The 9755 I/O chassis has one 130 amp power supply; thus, the TOTAL amperage draw for the CPU, memory boards and I/O controllers must be considered when configuring the available 10 chassis slots for I/O controllers.

BOARD	ESTIMATED AMPERAGE
MDLC - 2 lines	11.1
MDLC - 4 lines	11.5
Tape Controller (4520F/4522F)	19.3
GCR Tape Controller (4550/4590)	14.0
Streamer Controller	6.9
Unit Record Controller	10.3
Systems Options Controller	7.8
PRIMENET Node Controller II (PNC II)	12.7
AMLC	8.6
ICS1	6.7
ICS2	12.8
ICS3	12.8
Disk Controller (4005)	10.2
Disk Controller (6580)	13.0
Cartridge Tape Controller	
Disk Tape	13.8
Tape Only	4.2

9955 II SYSTEM

There are several system packages for the 9955 II. Each contains the 9955 II CPU; however, they differ in memory, disk and tape configurations. For proper configuration information on all hardware and software communications products, please refer to Section 4.

Hardware and Software Supplied

The standard hardware and software components included in all 9955 II systems are:

- 9955 II Central Processor
- PRIMOS Operating System (Execute-Only, Rev. 20.0.2 or greater)
- Diagnostic Processor, System Console, Cable and Modem (60Hz only)
- Twin-Bay Computer Room Cabinet and Chassis
- Two 130 amp Power Supplies for I/O Chassis
- Memory Boards (One or Two 8MB board)
- Memory Power Supply
- Disk Subsystem (300MB, 315MB, 496MB or 675MB)

Note: Packaged systems do not include communications hardware.

Optional Hardware and Software

Optional hardware and software available with the 9955 II includes communications subsystems, disk subsystems, tape subsystems, unit record subsystems, memory and software products.

Communications Subsystem Options

The 9955 II bulkhead supports 64 asynchronous and eight synchronous lines. A maximum of 254 asynchronous lines may be connected; however, additional communications hardware must be configured. For the proper configuration of all communications capabilities, please refer to Section 4.

Disk Subsystem Options

Any Prime disk subsystem, except the 60MB and 120MB (used with the 2350 and 2450 systems), and the 68MB/158MB (used with the 2250), may be installed with the 9955 II. The first packaged disk subsystem includes a controller, cable and disk. A peripheral cabinet is also included with rack-mounted devices. Each controller supports a maximum of four disk drives of any variety. Up to four disk controllers can be supported by each 9955 II, for a total of 16 disk drives. See Section 2 for more information concerning disk subsystems.

Magnetic Tape Subsystem Options

Some packaged 9955 II systems include a magnetic tape subsystem. All of Prime's 50 Series tape subsystems may be used with the 9955 II. A maximum of two tape subsystems and four tape drives per subsystem can be supported, for a total of eight drives.

Unit Record Subsystem Options

Unit record subsystems support up to two line printers and a card reader. The 9955 II supports up to two unit record subsystems. More information concerning unit record controllers is found in Section 2.

Main Memory

Minimum memory of 16MB is available in two 8MB boards. Memory can be expanded in 4MB or 8MB increments, to a maximum of 32MB of main memory. 9955 II memory boards are self-interleaved; i.e., there is no performance advantage utilizing pairs of boards.

System Specifications

Please refer to Appendix A for 9955 II system specifications.

Cabinet dimensions and configuration guidelines are covered in greater detail in Section 5.

Configuration Limitations

The 9955 II CPU and memory use their own chassis and power supplies, and allow a maximum of 32MB of memory. The 9955 II I/O chassis has two 130 amp power supplies; thus, the number of chassis slots (up to 14), rather than the amperage draw, must be considered. The limit of 14 chassis slots for I/O is due to the electrical characteristics of the I/O bus. The I/O boards which can be included in a 9955 II system are:

AMLC
ICS1
ICS2 Controller
ICS3 Controller
MDLC (2 or 4 - line versions)
Tape Controller (4550F)
* Tape Controller (4520F/4522F)
Systems Option Controller
PRIMENET Node Controller II (PNC II)
Disk Controllers
Unit Record Controller
Streamer Controller (4560F)
Cartridge Tape (4581F)

* The Tape Controller for devices 4520F and 4522F is two boards, but counts as one of the 14 loads on the I/O bus.

NOTE: The 9955 II Diagnostic Processor does not reside on the system I/O bus, and therefore does not count as an I/O bus load.

SECTION 2

CONFIGURATION REQUIREMENTS

Section 2 describes the following components used by the 2250, 2350, 2450, 2655, 9655, 9755 and 9955 II systems:

- Diagnostic Processors
- Memory Requirements
- Communications Hardware Requirements
- Disk Subsystems
- Streaming Magnetic Tape Subsystems
- Unit Record Subsystems (including printers and other I/O devices)
- Serial Interface Devices
- Paper Tape Device Cable Requirements

2250 DIAGNOSTIC PROCESSOR

The 2250 Diagnostic Processor performs a variety of system integrity and administrative functions. It allows the system console to be used as a user terminal, as well as a control panel. Note that the VCP function is performed by the diagnostics. The diagnostic processor performs an auto-boot to PRIMOS.

Some of the more significant features of the 2250 diagnostic processor include:

- Requires no I/O slot; it interfaces directly into the CPU.
- Does not provide a serial printer port.
- Allows the system console to be used as a user terminal.
- Has jumper-selectable default baud rates.

2350 AND 2450 DIAGNOSTIC PROCESSOR

The new VCP4 Diagnostic Processor, like its predecessor the VCP3, is a Z80 microprocessor-based board, which includes the capability of operating as the system operator terminal, a user terminal, a remote terminal (modem connection or remote servicing), and a VCP interface. The VCP4 also supports the loadable control store, CPU ID prom, system identification prom, battery backed-up time-of-day clock, environmental sensors, and the optional use of an Uninterruptible Power Source. Unlike the VCP3, the VCP4 plugs directly into the backplane. This feature allows the VCP4 to perform voltage margining and failure detection. Other features include a built-in modem (60Hz units only), and the ability to use an E-PROM cartridge to load microcode.

2655 DIAGNOSTIC PROCESSOR

The 2655 diagnostic processor performs a variety of system integrity and administrative functions. Two diskette drives, used for operational and diagnostic microcode loading, are under control of the diagnostic processor.

The 2655 has an automatic system start-up feature, invoked when the operator presses the System Power Switch on the status panel. This start-up condition to multi-user PRIMOS is controlled by the diagnostic processor. Time-of-day and date are fed to PRIMOS at the appropriate point from a battery-operated clock on the diagnostic processor. The VCP function is also performed by the diagnostic processor.

The diagnostic processor also controls the operator's console. A technical specialist can locally or remotely control any 2655 system to provide fast, effective trouble-shooting for identifying a hardware problem, and for performing comprehensive system software diagnostics.

9655, 9755 AND 9955 II DIAGNOSTIC PROCESSORS

The diagnostic processor for the 9655, 9755 and 9955 II performs a variety of system integrity, administration and monitoring functions. Two diskette drives, used for operational and diagnostic microcode loading, are under control of the diagnostic processor. The system status panel, with operator switches and indicators, interfaces to the diagnostic processor. Another function of the diagnostic processor is environmental sensing, which monitors the system airflow and temperature sensors. At a predetermined temperature, the system notifies PRIMOS, which sends a warning to the operator's console. At a second predetermined temperature level, the system automatically powers-down.

The system has an automatic system start-up feature, invoked when the operator presses the System Power Switch on the status panel. This start-up condition to multi-user PRIMOS is controlled by the diagnostic processor. Time-of-day and date are fed to PRIMOS at the appropriate point from a battery-operated clock on the diagnostic processor. The VCP function is performed by the diagnostic processor subsystem, therefore no VCP is required on the system.

An operator's console, either a PT200 video terminal or a hard-copy terminal, is controlled by the diagnostic processor. A technical specialist can locally or remotely control any system to provide fast, effective trouble-shooting for identifying a hardware problem, and for performing comprehensive system software diagnostics. The remote system administrator, when in control mode, can completely run the system from a remote terminal, including tasks such as bootloading and on-line operations.

MEMORY REQUIREMENTS

Configuration rules for the following memory types will be outlined in this section:

MMW1-HMB - 512KB board (E7), can be used only on the 2250, 2550, 9650 and 9655. It supports only wide-word operation in pairs for the 2550, 2655, 9650 and 9655. The 2250 does not support wide-word operation, and can make use of non-paired configurations.

MMW1-1MB - 1024KB board (E8), can be used only on the 2250, 2550, 2655, 9650 and 9655. It supports only wide-word operation in pairs for the 2550, 2655, 9650 and 9655. The 2250 does not support wide-word option, and can make use of non-paired configurations.

MMW1-E9 - 1024KB board (E9), can be used only on the 2250, 2550, 2655, 9650 and 9655. It supports only wide-word operation in pairs for the 2550, 2655, 9650 and 9655. The 2250 does not support wide-word operation, and can make use of non-paired configurations. This board also supports self-interleaving for improved performance in non-paired configurations on the 2250.

* MMW1-2MB - 2048KB board (2MB TTL), wide-word, self-interleaving, can be used on any processor, except the 9750, 9755, 9950, 9955 and 9955 II.

* MMW1-4MB - 4096KB board (4MB TTL), wide-word, self-interleaving, can be used on any processor except the 9750, 9755, 9950, 9955 and 9955 II.

MMW2-2MB - 2048KB board (2MB ECL), wide-word, self-interleaving, can be ordered only for use on the 9750, 9755, 9950 and 9955 systems. It cannot be used on any TTL system or the 9955 II.

MMW2-4MB - 4096KB board (4MB ECL), wide-word, self-interleaving, can be ordered only for use on a 9650, 9755, 9950, 9955 or 9955 II system. It cannot be used on any TTL system.

MMW2-8MB - 8192KB board (8MB ECL), wide-word, self-interleaving, can be used only on the 9750, 9755, 9950, 9955 and 9955 II systems.

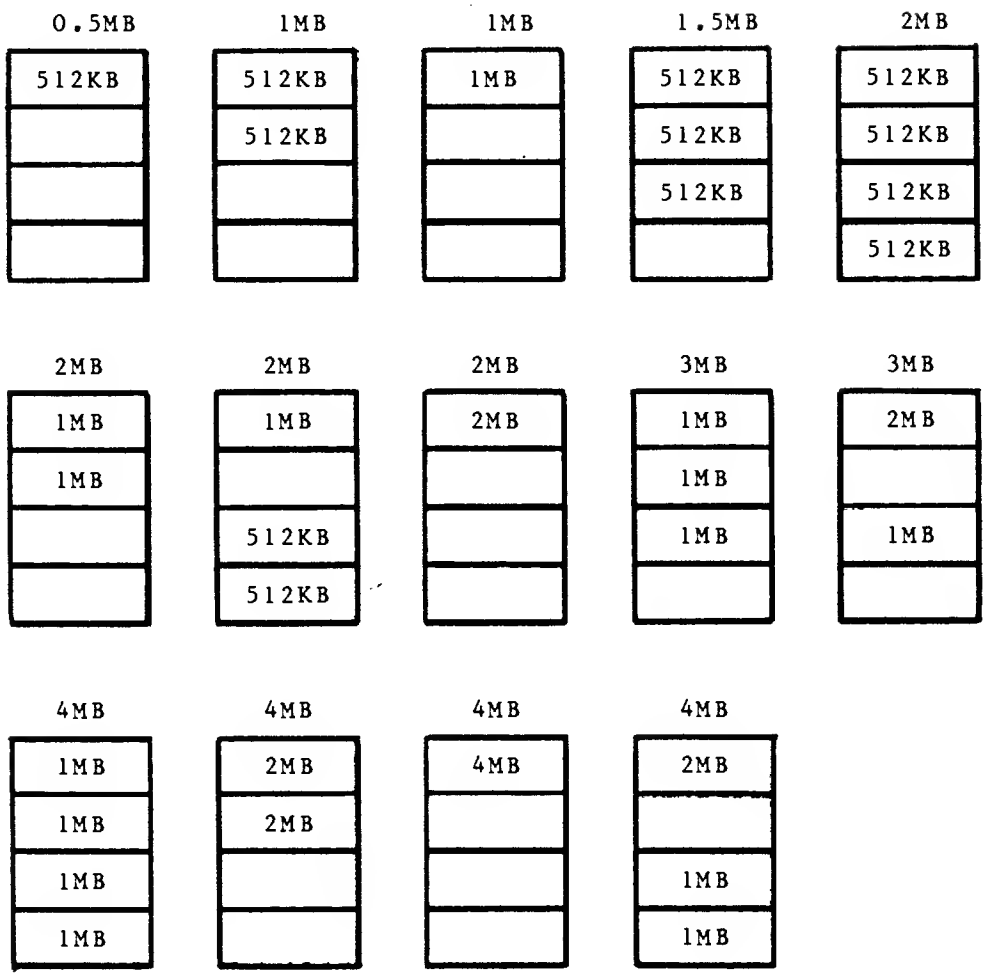
* The MMW1-2MB and MMW1-4MB memory boards are the same as the MMW1-2MT and MMW1-4MT memory boards, respectively. The 2MT and 4MT memory boards may only be ordered for 2350 and 2450 systems.

TABLE 2-1. MAIN MEMORY CONFIGURATION INFORMATION

System	Minimum Memory	Maximum Memory	Available Slots	MMW1-2MB MMW1-4MB MMW1-2MT MMW1-4MT	MMW1-E9	MMW2-4MB MMW2-8MB	MMW2-2MB
2250	.5MB	4MB	4	Yes	Yes	No	No
2350	2MB	8MB	3	Yes	No	No	No
2450	2MB	8MB	3	Yes	No	No	No
2550	2MB	8MB	8	Yes	Yes	No	No
2655	4MB	8MB	4	Yes	Yes	No	No
9650	2MB	8MB	8	Yes	Yes	No	No
9655	4MB	8MB	8	Yes	Yes	No	No
9750	4MB	12MB	6	No	No	Yes	Yes
9755	8MB	16MB	8	No	No	Yes	Yes
9950	4MB	16MB	8	No	No	Yes	Yes
9955	4MB	16MB	8	No	No	Yes	Yes
9955 II	16MB	32MB	8	No	No	Yes	No

System Memory Board Configurations - 2250

2250 configuration rules are given below:



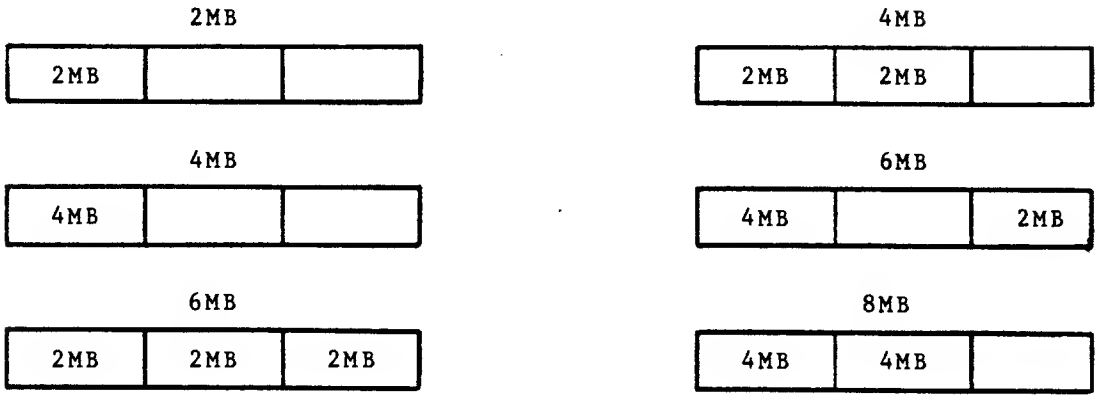
NOTE: The 2250-019 system will only support up to 3-slot memory configurations.

The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed. Any open spaces between the memory boards indicated above (and on the previous page) must remain unfilled.

E8 1MB memory in non-paired configurations must have an open slot next to it in order to operate.

System Memory Board Configurations - 2350 and 2450

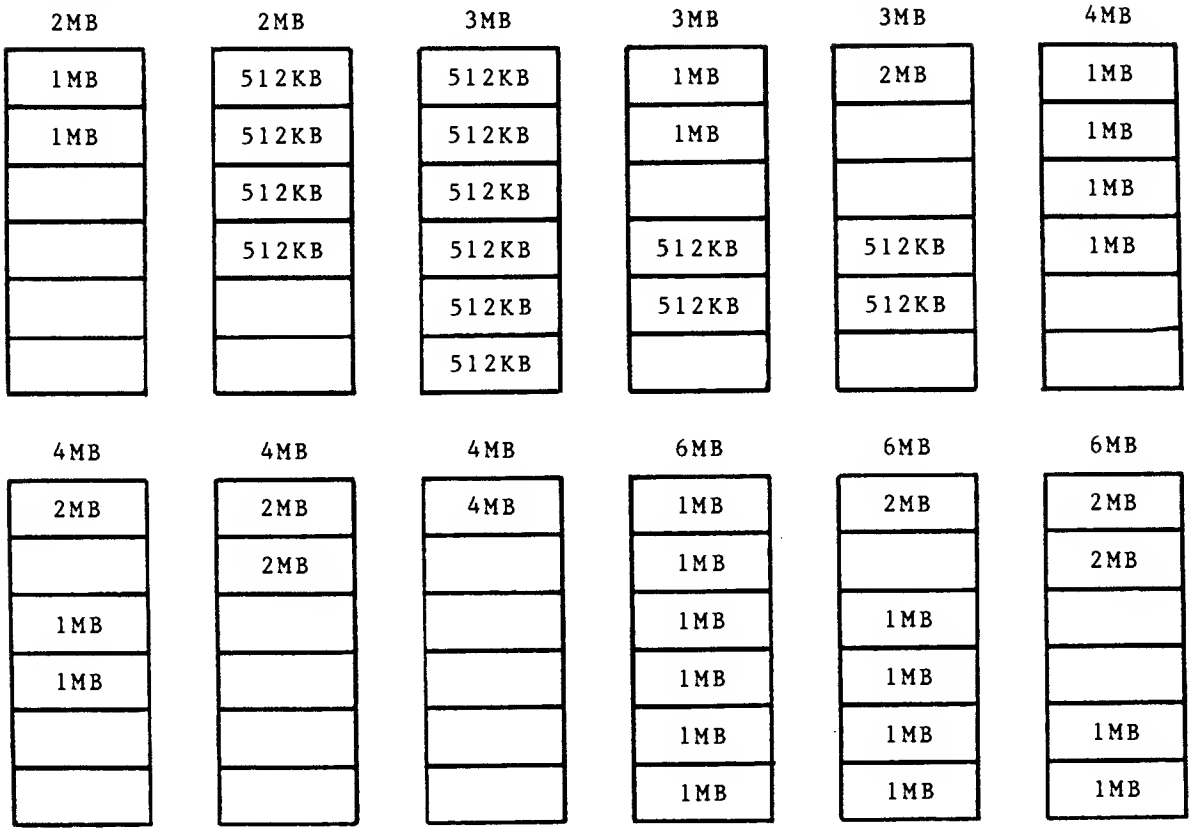
2350 and 2450 configuration rules are illustrated below:



NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed. Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 2550

Configuration rules for the 2550 are illustrated below:

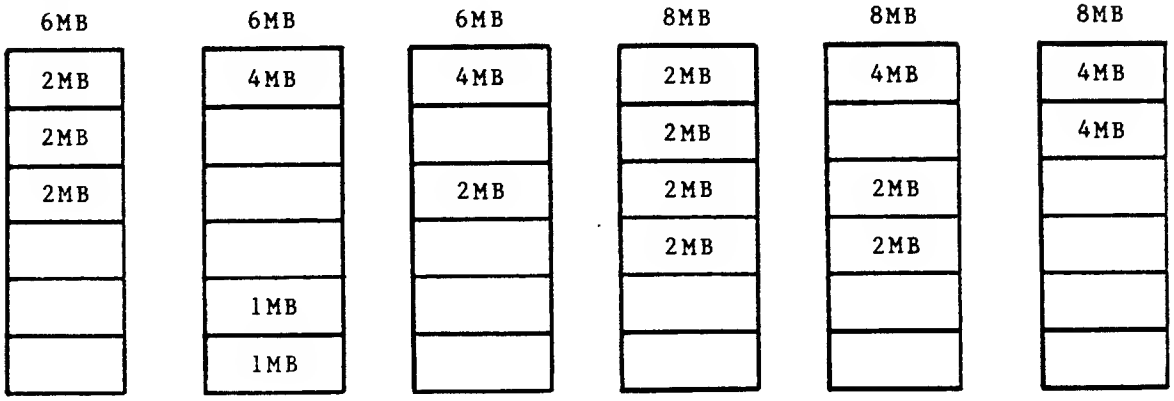


NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 2550 (continued)

Configuration rules for the 2550 are illustrated below:

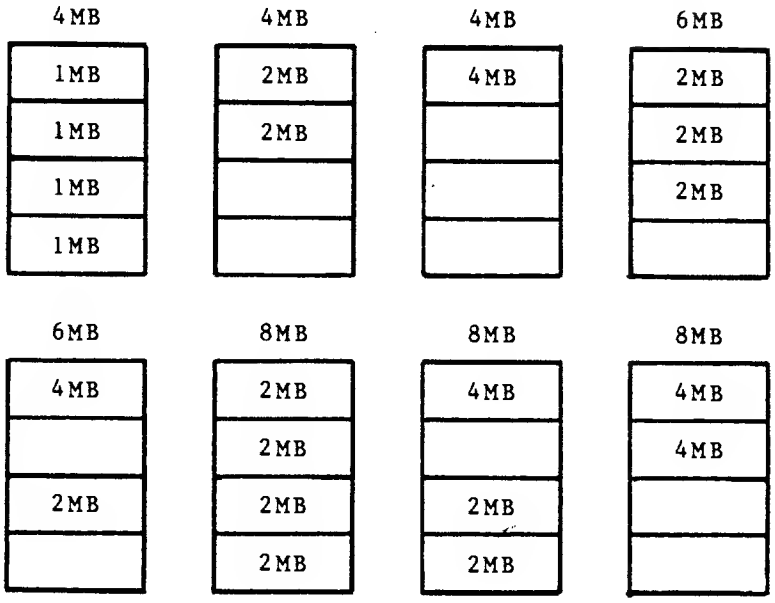


NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 2655

Configuration rules for the 2655 are illustrated below:

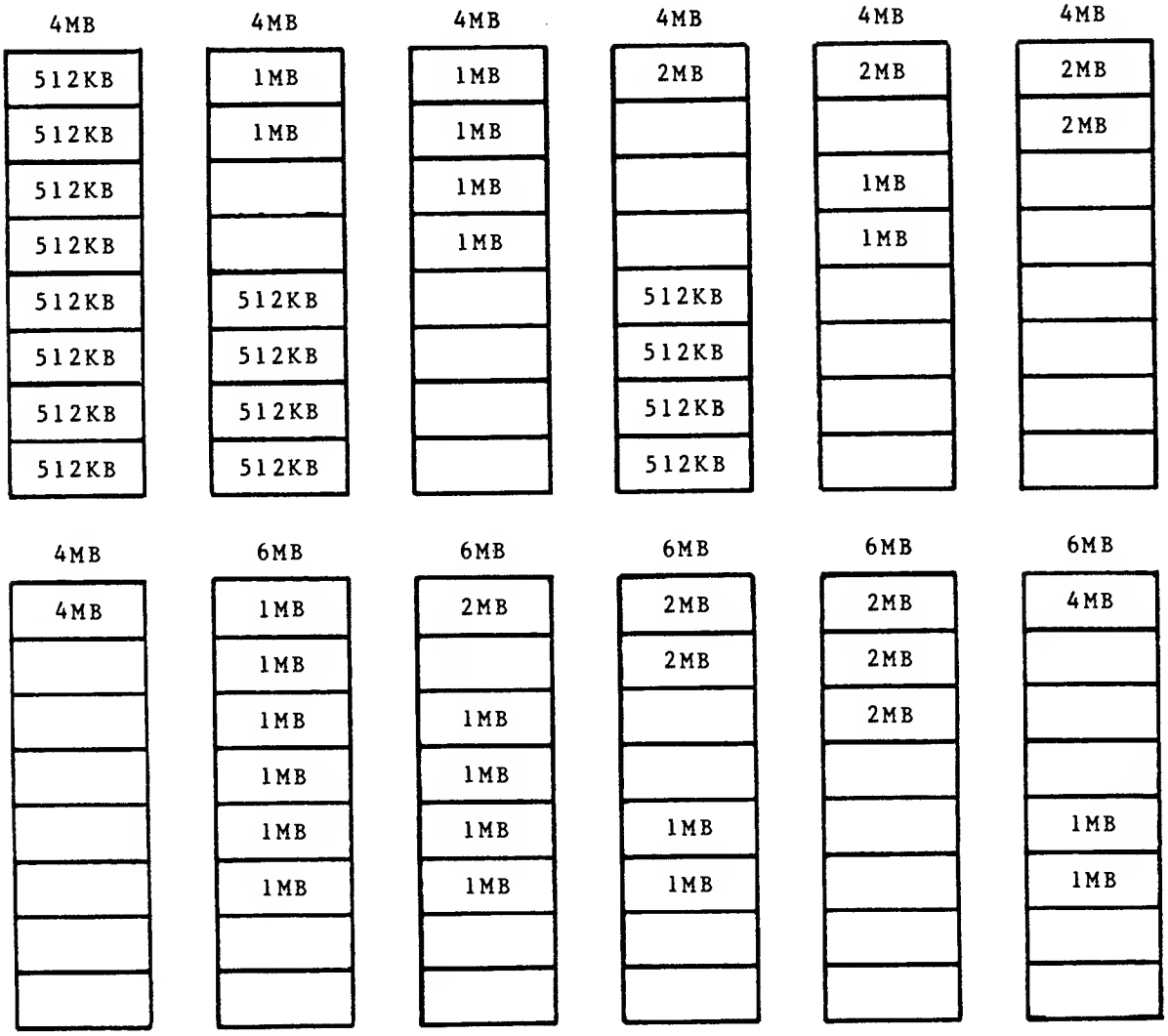


NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 9655

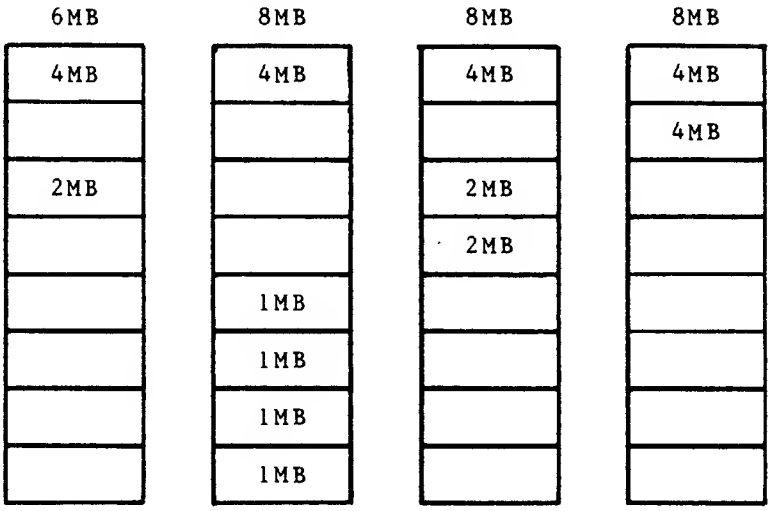
Configuration rules for the 9655 are illustrated below:



NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 9655 (continued)

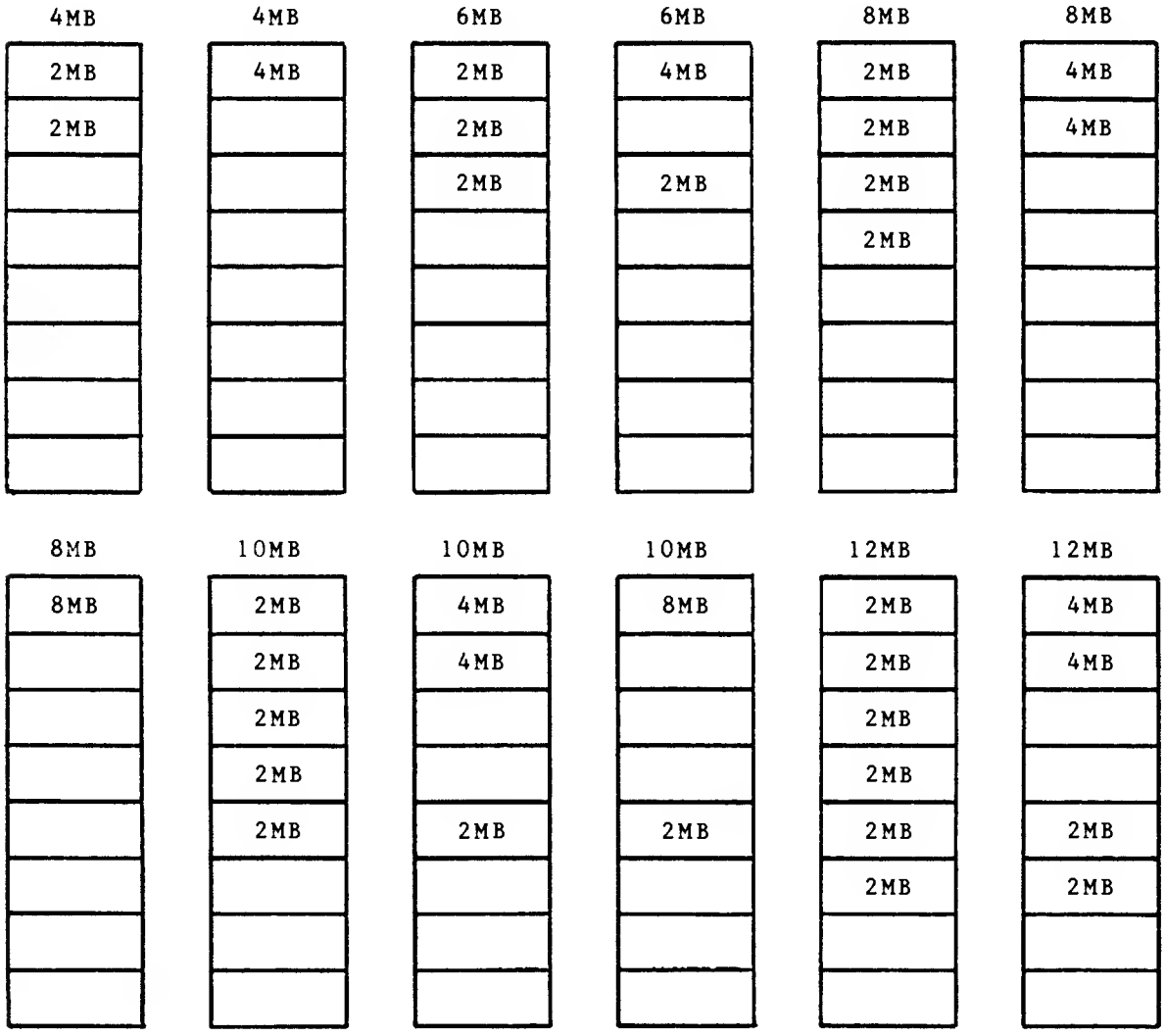


NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 9750, 9755, 9950 and 9955

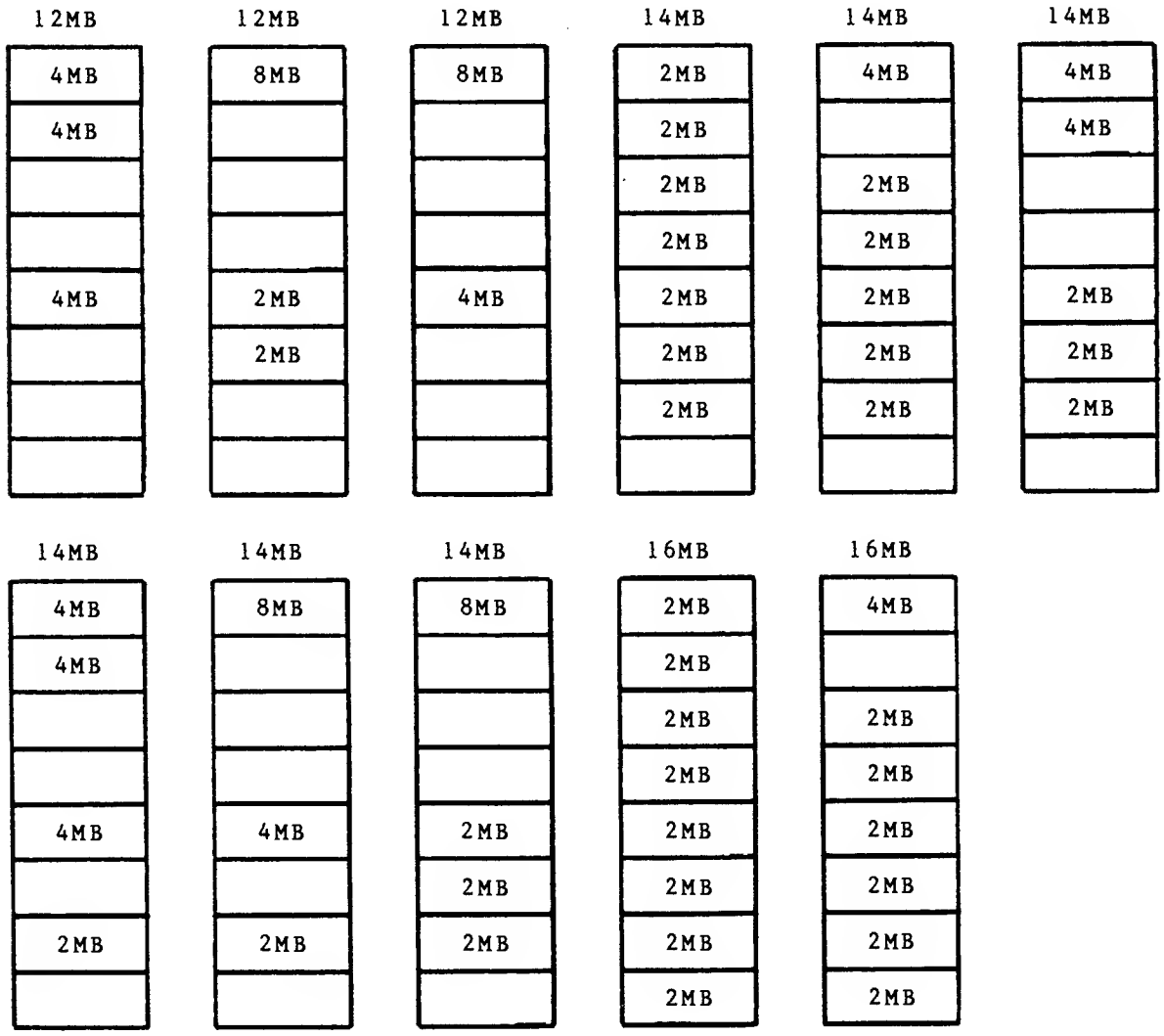
Memory configuration and slot availability for the 9750, 9755, 9950 and 9955 are illustrated below. Any configurations which exceed 12MB of total memory, or exceed six chassis slots, are not valid for the 9750.



NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

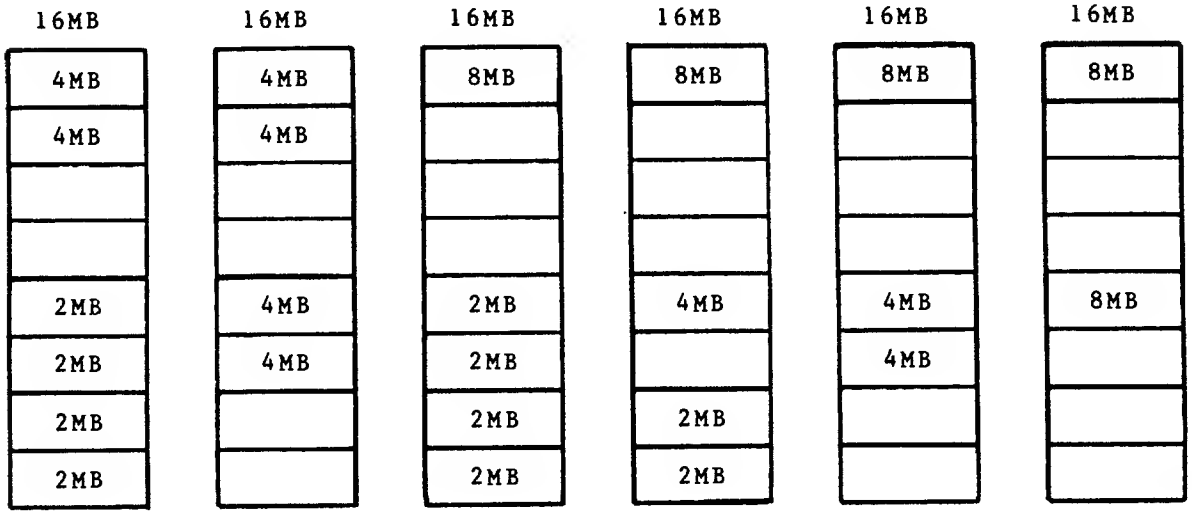
System Memory Board Configurations - 9750, 9755, 9950 and 9955 (continued)



NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 9750, 9755, 9950 and 9955 (continued)

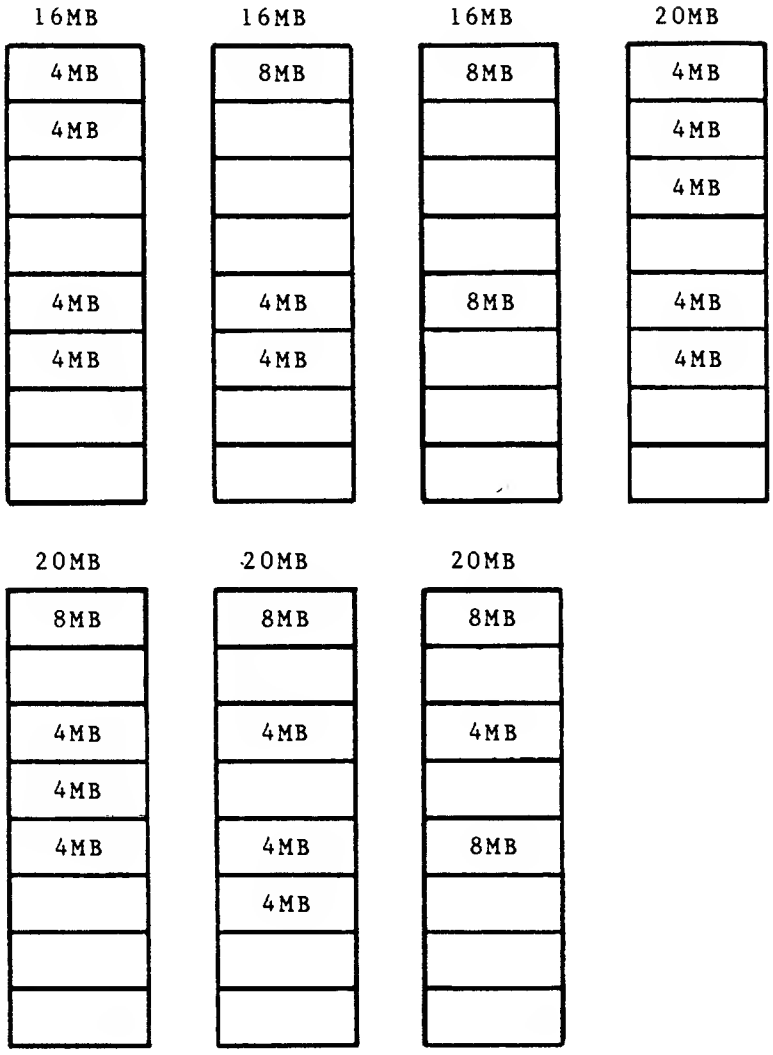


NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open spaces between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 9955 II

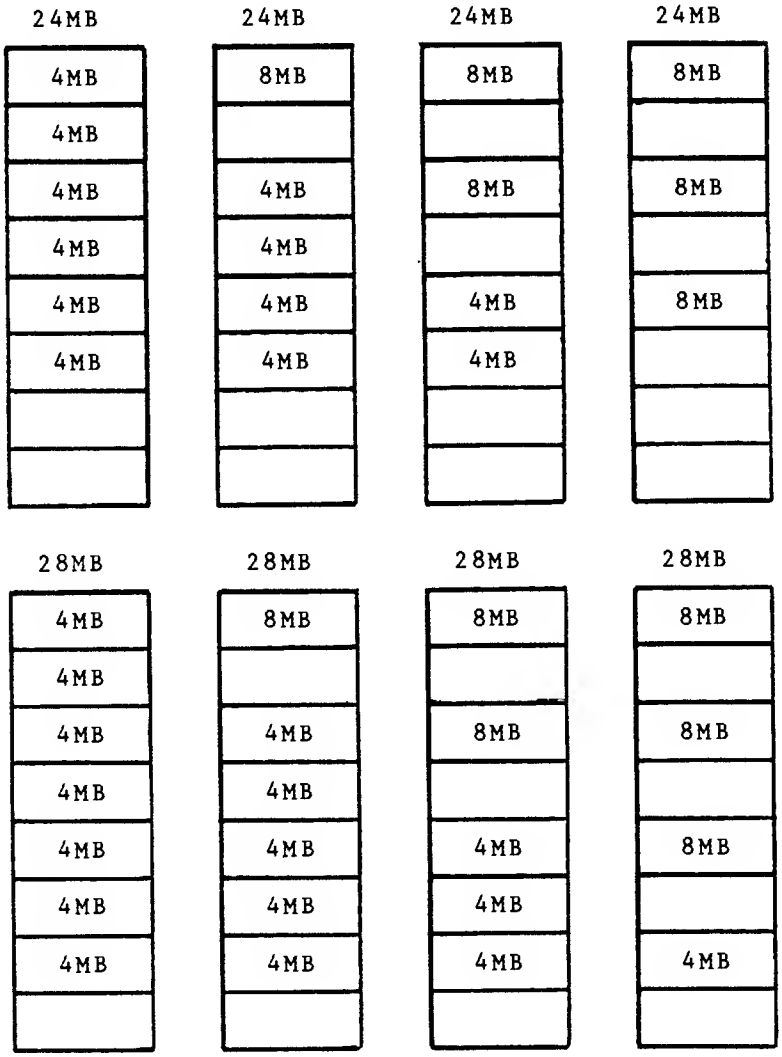
Memory configuration and slot availability for the 9955 II is illustrated below.



NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open slots between the memory boards indicated above must remain unfilled.

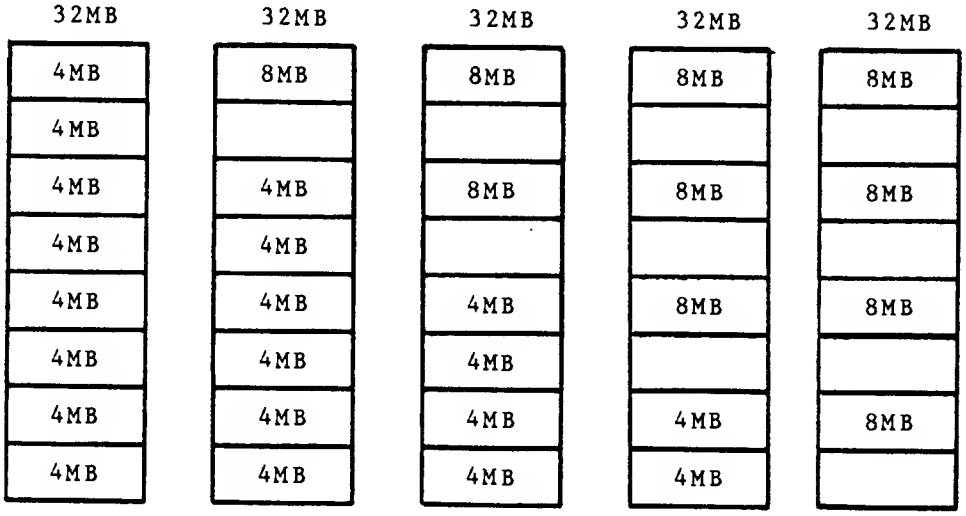
System Memory Board Configurations - 9955 II (continued)



NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open slots between the memory boards indicated above must remain unfilled.

System Memory Board Configurations - 9955 II (continued)



NOTE: The order of placement of the boards in the chassis will be determined by Customer Service when the memory is installed.

Any open slots between the memory boards indicated above must remain unfilled.

Memory Interleaving

Like pairs of boards are needed to achieve interleaving with the following memories on 50 Series systems (except the 9750 and 9955): E7 (two .5MB boards provide 1MB of interleaving), E8 and E9.

When using E7, E8 or E9 memories with the 2550, 2655, 9650 or 9655, like pairs must always be used.

The following memories are self-interleaving, requiring only a single board. They are: MMW1-2MB, MMW1-2MT, MMW1-4MB, MMW1-4MT, MMW2-2MB, MMW2-4MB, MMW2-8MB.

The E9 board (MMW1-E9) is self-interleaving on the 2250 system.

TERMINALS

Both hardcopy and CRT display terminals are used with the 50 Series systems. The terminals are further classified as system terminals and user terminals, depending on how they are used and how they are interfaced to the system (i.e., via the Diagnostic Processor, AMLC, ICS1 or ICS2).

System Terminals

System terminals are configured as direct-connect devices or as remote terminals (via asynchronous modems) to the Virtual Control Panel (VCP) or Diagnostic Processor (described previously in this section). Because the 2350 and 2450 systems (domestic units, U.S. and Canada) have an imbedded modem, only one additional modem (Bell type number 103J, 103A3, 103F or 113 or equivalent) is required for remote operation when communicating via the VCP (or diagnostic processor). Two asynchronous Bell modems are required for all other 50 Series processors.

User Terminals

User terminals are configured as direct-connect or remote devices (via modems), and interface to the system via an AMLC, ICS1 or ICS2. For local operation, the terminal may be connected directly to the communications controller. Remote configurations require two asynchronous Bell (Type Number 103J, 103A3, 103F or 113) or equivalent modems, and an AMLC, ICS1 or ICS2 line. For cable configuration information, please refer to Section 4. Specifications are provided in Tables 2-4 and 2-5.

Prime's own user terminal, the PERFORMER (PT200), as well as the color version (PT200M-C1 or C2), is compatible with all 50 Series CPUs offered worldwide. The PT200 can be upgraded with a graphics option (Model Number PT200A-GM); this option can be installed in the standard monochromatic unit, as well as the color version. For information on the installation of this option, please refer to the PT200 Graphics Option Installation Instructions (FDR8717-1LA).

The proper procedure for connecting a PT200 to a 50 Series system is the same as for any of the above-mentioned configurations. The PT200 does not come with any cables; therefore, be sure the appropriate cables are ordered when ordering a terminal for new installation. Because requirements vary, some customers using modems might need to order two cables (one for CPU-to-modem and another for terminal-to modem). Other users with terminals located close to the CPU will need only one cable to connect the terminal directly.

A choice of several cables is available when installing or adding to a terminal site, depending on the configuration. Some of the alternatives are defined and illustrated on the following pages (Figure 2-1, 2-2).

User Terminals (continued)

A choice of several cables is available when installing or adding to a terminal site, depending on the configuration. Some of the alternatives are defined and illustrated on the following pages (see Figures 2-1 and 2-2). Refer to Table 2-2 for terminal-to-host connector specifications. This table describes the PT200 Terminal Serial Main Connector Pin configurations. The signal names are given with respect to the terminal.

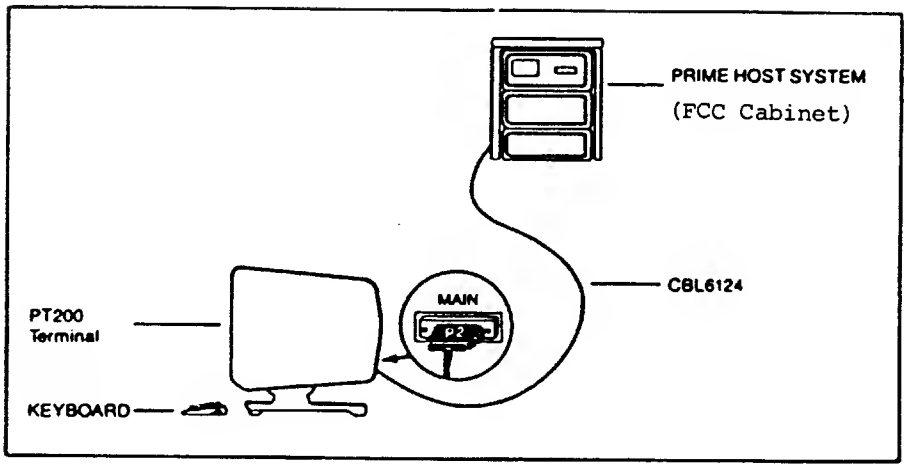


Figure 2-1. FCC Host Systems

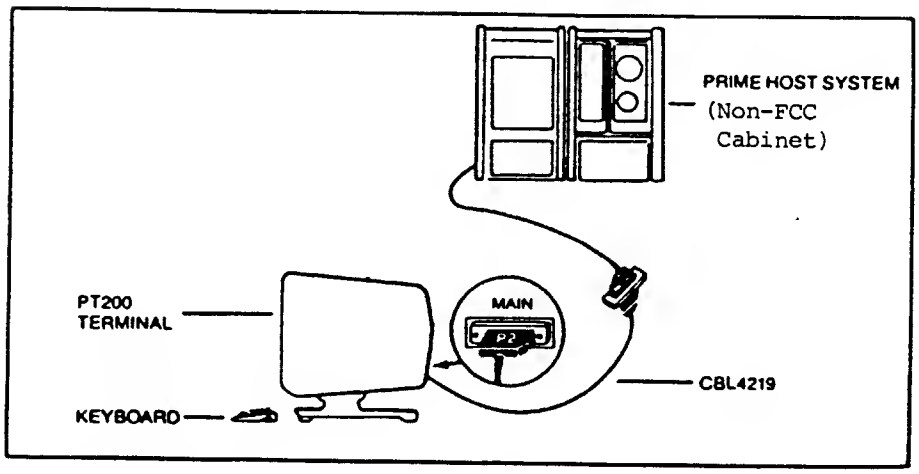


Figure 2-2. Non-FCC Host Systems

Printer-to-Terminal Cables

When connecting a printer, with a serial interface port, to the PT200 terminal, use a 9-pin D-type connector (male) with pin assignments consistent with RS232C specifications. Prime's cable CBL6124 is suitable for this use. The 9-pin end of this cable connects to the terminal and the 25-pin end connects to the printer.

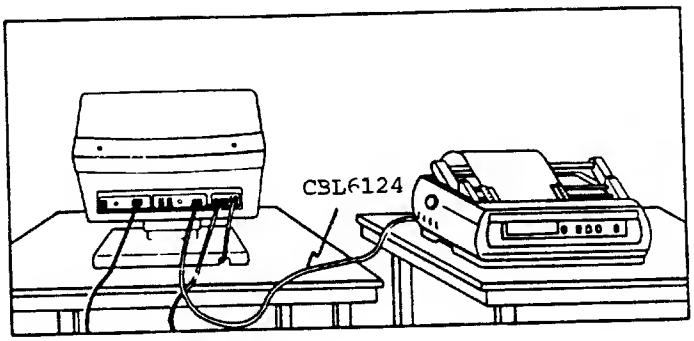


Figure 2-3. Printer-to-Terminal Cable

NOTE: Table 2-3 provides the specifications for a printer connector required for attachment to the PT200 terminal.

TABLE 2-2. TERMINAL SERIAL MAIN CONNECTOR PIN CONFIGURATION

Pin Number	Description	Notes
J1-1	Protective Ground	
J1-2	Transmitted Data (negative)	TX
J1-3	Received Data (negative)	RX
J1-4	Request to Send (negative)	TX
J1-5	Clear to Send	RX
J1-6	Data Set Ready	RX
J1-7	Signal Ground (Common Return)	
J1-8	Received Line Signal Detector (DCD)	RX
J1-9	Transmitted Data (positive)	
J1-10	----	
J1-11	Request to Send (positive)	
J1-12	Data Terminal Ready (positive)	
J1-13	Received Data (positive)	
J1-14	Clear to Send (positive)	
J1-15	Transmission Signal Element Timing	RX
J1-16	DCD (positive)	
J1-17	Receive Signal Element Timing	RX
J1-18	----	
J1-19	----	
J1-20	Data Terminal Ready (negative)	TX
J1-21	Data Set Ready (positive)	
J1-22	----	
J1-23	----	
J1-24	Transmission Signal Element Timing	TX
J1-25	----	

TABLE 2-3. PT200 TERMINAL SERIAL PRINTER CONNECTOR PIN CONFIGURATION

Pin Number	Description	Notes
J2-1	Protective Ground	
J2-2	Transmitted Data (negative)	TX
J2-3	Received Data (negative)	RX
J2-4	----	
J2-6	----	
J2-7	Signal Ground (common return)	
J2-8	----	
J2-9	----	

TABLE 2-4. MODEL 3115F HARDCOPY TERMINAL SPECIFICATIONS

Data Transmission:	
Code	US ASCII
Interface	EIA standard RS-232-C, asynchronous
Transmission Rate	Keyboard selectable at 110/300/1200 baud
Mode of Operation	Full- or half-duplex
Functional Details:	
Print Speed	30 CPS (60 CPS catch-up mode)
Copies	Original and 2 copies
Character Spacing	10, 13.2, 15.6
Line Spacing	2, 3, 4, 6, 8 and 12 lines/inch
Line Length	13.2 inches
Character Set	96 character set with upper and lower case
Character Style	9 x 7 dot matrix
Ribbon	Cartridge

TABLE 2-5. PT200 TERMINAL SPECIFICATIONS

Monitor:	
Control:	Microproceesor
Type:	CRT
Screen Size:	355mm (14 in.) diegonel
Phosphur:	P31 (green) etenderd, P4 (white) optionel, PC-124 (yellow) optional
Diapley Formats:	24 lines 80 cheracters/line 25th status line OR ... 27 lines 132 cherecters/line 28th etetus line
Diepley Memory:	1 or 2 pegee (3840 cherecters meximum)
Charecter Size:	7 x 9 matrix (lower ceee w/deecenders)
Character Set/Attributea:	
Character Set:	256 ASCII
Vieuel:	Normel, decreeeed intensity, underlining, blinking, blenking, reveree video, etrike through
Cursor:	Underlining, blinking underline, or reveree video block
Communicetions:	
Line Interfece:	EIA RS-232-C (CCITT V.24) No current loop
Trenemieeion Mode:	Full/Helf Duplex Block mode
Protocol:	XON/XOFF
Speed:	50 to 19.2K Bpe
Opereting Modee:	Cheracter interective or block mode
Keyboerd:	Selectric leyout, deteched, 40 ueer progremmeble function keye, 15 key numeric keypad, cureor control keye, euto repeet
Printer Interfece:	
Printer Port:	
Standerd:	Rev. E or leter
Interface:	Seriel
Speede:	Up to 19.2K Bpe
Modea:	Screen drewing, paes through, trenaparent peee through
Printer Specificetiona:	XON/XOFF

PERFORMER PC Option

The PT200 terminal can be enhanced to include personal computer functionality, with the optional PERFORMER PC Upgrade. To order the dual diskette option, order Model Number PC200; the Winchester option is PC210. Either of these can be added to the PT200 terminal, as a direct connect local device. The interface between the PC Option and the PT200 terminal consists of two circuit boards (which are installed inside the PT200 chassis), two ribbon cables to connect the circuit boards, and a daisy chain power cable. All of these required devices are supplied with the PC upgrade option package; no additional cables are required. For more information on the PERFORMER PC Option, please refer to the PERFORMER PC Installation Guide (DOC 9714-1LA).

Cables for the PERFORMER PC Option

Printers can be connected to either the PT200 terminal, or to the PERFORMER PC Multifunction board (which resides in one of the PERFORMER PC chassis slots). A description of the physical connection to either the terminal or the PERFORMER PC is detailed below.

Printer-to-Terminal Cables

When connecting a printer with a serial interface port to a PT200 terminal, the 9-pin, D-type connector (male) supplied with the PC option must be used. This connector is consistent with the pin assignments for a PT200 Terminal Serial Printer Connector, shown in Figure 2-1 and described in Table 2-3. Refer to the accompanying Table 2-6 for printer configurations.

Printer-to-PERFORMER PC Option Cables

When connecting a printer to a PC200 or PC210, the PC option must first be upgraded with an expansion board to provide the necessary parallel interface port. The PERFORMER PC Multifunction Board (Model Number PC200A) has such a parallel interface port. A printer connector cable, consistent with the Centronics Parallel Configuration, is required. There parallel printer cables can be obtained from most personal computer vendors. Refer to Table 2-7 for specifications. This table describes the Parallel I/O Connector Pin Assignments for the Prime Multifunction Board on the PERFORMER PC, with respect to the expansion board. For more information on the PC Multifunction Board, please refer to the PERFORMER PC Multifunction Board Installation Guide DOC 10074-1LA).

Other third party-developed expansion boards may also be used for parallel printer connection, provided they have a similarly configured I/O port. Users should refer to Table 2-6 for printer compatibility.

Printer-to-PERFORMER PC Option Cables (continued)

Any serial printers would normally be connected to the terminal with the cable supplied with the PC Option (please see previous section entitled "Printer-to-Terminal Cables"). The Multifunction Board also has a serial port. These serial printer cables can also be obtained from most personal computer vendors. Keep in mind that the version of DOS that is supplied with the PERFORMER PC only supports a maximum of two serial ports. This means that users cannot connect serial cables to the two serial ports on the terminal and the serial port on the MULTIFUNCTION BOARD.

TABLE 2-6. PRINTER CONFIGURATIONS

	PC MODE PRINTING	TERMINAL MODE PRINTING
Serial Printers	Epson or compatible; Must support CTS	Epson or compatible; must support CTS
Serial Cable	Supplied with PERFORMER PC Option	Same cable used for PC mode XON/XOFF
Parallel Printers	Epson/NEC or any IBM printer w/Centronics compatible connector	N/A
Parallel Cable	Available from local computer dealers	N/A
BOTH PC AND TERMINAL MODE PRINTING		
Serial Printers	Epson or compatible; must support simultaneous CTS and XON/OFF	
Serial Cable	Supplied with PERFORMER PC Option	
Parallel Printers	N/A	
Parallel Cable	N/A	

1. Serial printer port located at the back of the PT200.
2. Parallel printer port is included in the Memory Expansion Board sold by Prime.
3. CTS (Clear to Send) and XON/XOFF are printer protocols.

TABLE 2-7. PC EXPANSION BOARD PARALLEL PORT WIRING	
Pin Number	Description
Pin 1	Strobe
Pin 2	Data 0
Pin 3	Data 1
Pin 4	Data 2
Pin 5	Data 3
Pin 6	Data 4
Pin 7	Data 5
Pin 8	Data 6
Pin 9	Data 7
Pin 10	ACK
Pin 11	Busy
Pin 12	P. End
Pin 13	Select
Pin 14	Auto Feed
Pin 15	Error
Pin 16	Initialize
Pin 17	Select Input
Pin 18	Ground
Pin 19	Ground
Pin 20	Ground
Pin 21	Ground
Pin 22	Ground
Pin 23	Ground
Pin 24	Ground
Pin 25	Ground

DISK SUBSYSTEMS FOR THE 2250

Each 2250 system supports two types of fixed-media disk subsystems. The first subsystem supports a maximum of one controller (Model 4004), which can be configured with up to four devices. Four compatible Winchester devices, with capacities of 68 and 158MB storage, can be mixed on a single controller board. This controller has a microprocessor with built-in self-check tests to insure system integrity.

The second subsystem supports a maximum of one controller (Model 4005), which can be configured with up to two Winchester 315MB drives.

2250 Disk Subsystems

All 2250 central system models with 68/158MB include a disk subsystem with one drive. The first drive is mounted in the top section of the 2250 central system cabinet; the second drive is mounted in the middle partition of the cabinet. Third and fourth drives are mounted in a 2250 expansion cabinet, which can be placed adjacent to the 2250 central system cabinet. The expansion cabinet is included with a third drive. Systems with the 315MB disk mount the disk and tape in a peripheral cabinet. The peripheral cabinet is included with the initial system (Model Number 2250-019(-A)). A second 315MB disk requires a second peripheral cabinet. The upper disk is removable from either cabinet by taking the top off the cabinet and lifting the drive unit out. The middle drive is removed by sliding it out the rear of the cabinet.

Peripheral devices cannot be mounted in the main cabinet of the 2250 when 315MB disk drives are configured.

See Tables 2-8 and 2-9 for configuration information on the 2250 disk subsystems. See Appendix A for the specifications for Product Numbers 4640, 4650 and 4475 disk subsystems.

NOTE 1: 158MB disk drives delivery was discontinued on 1/7/86.

NOTE 2: See Appendix A for disk specifications.

CATEGORY I

TABLE 2-8. 2250 DISK SUBSYSTEM CONFIGURATION INFORMATION

Device/Capability	Selectable Product Number	Device Description
Controller, first disk drive and cable	-	68MB or 158MB; included with 2250 central system.
Second drive and cable	4642-2250	68MB
Third drive, cabinet and cable	4643-2250	68MB
Fourth drive and cable	4644-2250	68MB
Second drive and cable	4652-2250	158MB*
Third drive, cabinet and cable	4653-2250	158MB*
Fourth drive and cable	4654-2250	158MB*

Also note that -A must be appended to the product number for 220 VAC, 50Hz operation.

CATEGORY II

TABLE 2-9. 2250 DISK SUBSYSTEM CONFIGURATION INFORMATION

Device/Capability	Selectable Product Number	Device Description
Controller, first disk drive, peripheral cabinet, and cable	-	315MB; included with 2250 central system.
Second drive and cable; requires second peripheral cabinet	4476L 7653L	315MB Peripheral Cabinet

* Discontinued products.

Also note that -A must be appended to the product number for 220 VAC, 50Hz operation.

DISK SUBSYSTEMS FOR THE 2350 AND 2450

Each 2350 and 2450 system supports two different types of Winchester Disk drives (a 60MB device and a 120MB device). The first disk drive is imbedded in each system. The second device is optional, and connects to the same disk controller that supports the imbedded drive. In addition, this disk controller supports the operation of a 60MB device and a 120MB device concurrently, so that users can mix and match drives to meet their needs.

2350 and 2450 Disk Subsystems

All 2350 and 2450 central systems include a disk subsystem with one drive. The first drive is mounted directly inside the system cabinet; the second drive is also mounted inside the system cabinet, next to the first drive. There is no need for an expansion cabinet to support these disk drives. These devices cannot be supported inside the peripheral cabinet that houses the Streaming Magnetic Tape Drive option.

The selectable product number for the second 60MB disk drive is 4711. The selectable product number for the second 120MB disk drive is 4715.

DISK SUBSYSTEMS FOR 50 SERIES SYSTEMS (EXCEPT 2250, 2350 and 2450)

Each Prime 50 Series system supports a maximum of two disk subsystems; each subsystem can support a maximum of four drives. This means that a system can have a total of two disk controllers and eight drives. The FCC-compliant system cabinet has a bulkheading restriction of up to 64 AMLC lines with two disk controllers, or up to 32 AMLC lines with three or four disk controllers. ICS2 lines are required if these limits are exceeded.

At PRIMOS Rev. 19.3, 50 Series systems (refer to Section 1) will support a maximum of four subsystems and 16 drives. Two physical types of disk drives are available on Prime 50 Series systems:

- Free-standing

  Storage Module Disk (SMD): 80, 300MB
  Fixed-Media Disk (FMD): 675MB

- Cabinet-mounted (also called rack-mounted)

  Cartridge Module Disk (CMD): 32*, 64*, 96MB*
  Fixed-Media Disk (FMD): 160MB*, 315MB
  Fixed-Media Disk (FMD): 496MB

Both cabinet-mounted and free-standing drives can be part of the same subsystem. All of the above described disk drives are SMD interface, except the 496MB, which is SMD-E interface.

Burst-Mode

Product Number 4005 disk controllers have burst-mode capability; however, it should be noted that burst-mode I/O is an operating characteristic of the central processor, not of the disk subsystems. Burst-mode enables 64-bit data transfer, otherwise data is transferred in 16-bit packets. The 4005 disk controller supports all free-standing and cabinet-mounted disk drives listed above, except the 496MB fixed-media disk drive.

The 6580 disk controllers have burst-mode compatibility and are required to support the high data rates of the 496MB disk drives. The 6580 uses standard controller address options, and supports up to four drives using either an SMD or SMD-E interface. The 6580 supports a mix of SMD and SMD-E interfaced disk drives, concurrently. The 6580 controller does not require a controller upgrade for drives 2-4.

* Indicates discontinued products

Free-Standing Disk Drive Subsystems

The free-standing disk subsystems (available in 80MB, 300MB and 675MB sizes) are shipped from the factory in separate containers and require on-site installation. Refer to the Site Preparation Guide, (IDR5029) for installation guidelines. See Table 2-10 for configuration information. Specifications for free-standing drives are summarized in Appendix A.

These subsystems are free-standing peripheral devices and are supplied with their own cabinet(s) and necessary cables. Be sure to use the appropriate type number when ordering. Equipment included as part of the basic free-standing subsystem is the disk controller, selectable type of disk drive, controller drive capability, required cables, disk pack and cabinet.

TABLE 2-10. FREE-STANDING DISK SUBSYSTEM CONFIGURATION INFORMATION

Device/Capability	Selectable Product Number	Device Description
Burst mode controller, first drive capability, first disk drive and cables	4461F 4471F 4491F	80MB SMD 300MB SMD 675MB FMD
Second drive capability, second drive*, cable	4462F 4472F 4492F	80MB SMD 300MB SMD 675MB FMD
Third drive capability, third drive*, cable	4463F 4473F 4493F	80MB SMD 300MB SMD 675MB FMD
Fourth drive capability, fourth drive*, cable	4464F 4474F 4494F	80MB SMD 300MB SMD 675MB FMD
Disk Packs (one supplied with removable media drives)	4246 4247	80MB SMD 300MB SMD

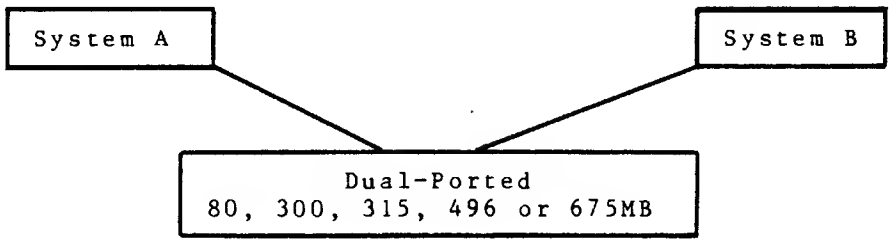
* Note: CMDs, 160MB* and 315MB FMDs may be added as the second, third and fourth devices.

Also note that -A must be appended to the Product Number for 220 VAC, 50Hz operation.

* Indicates discontinued product

Dual-Port Option "A Special"

The dual-port option allows two 50 Series systems to be physically connected to one 80, 300, 315, 496 or 675MB device, as shown below:



The dual-port capability is a hardware-only capability; PRIMOS does not support true dual-porting. This option simply allows two systems to be cabled to one storage module device; however, only one of the systems can access the disk at a time.

Note that the dual-port option is quoted and configured as a special only. Contact your Regional Systems Manager or the Custom Systems Group at (617)-626-1700 for configuration, pricing and delivery information.

Cabinet-Mounted Disk Drive Subsystems (CMDs* and FMDs)

Cabinet-mounted disk drives (CMDs and FMDs) are installed at the factory and require no on-site installation. Add-ons to systems in the field will require installation, unless ordered with a peripheral cabinet. The 315MB FMD subsystem can also be mounted in the 2550 and 2655 office peripheral cabinet. These subsystems may be used on all Prime 50 Series processors. The 496MB system is installable on 50 Series computer room systems only. Specifications are summarized in Appendix A.

Equipment included as part of the basic system-packaged, cabinet-mounted subsystem is the controller, selectable type of disk drive, controller drive capability, required cables, disk pack (where applicable) and peripheral cabinet. Add-on drives include controller upgrade (if the 4005 disk controller is used), but no cabinet.

* CMDs are discontinued products

Configuring Cabinet-Mounted Disks (See Section 5 for more details)

When ordering as an add-on to a packaged system, cabinet-mounted disks must be accompanied in one of the following ways:

- One CMD or 315MB FMD unit, or two 615MB FMD units can be mounted in each magnetic tape drive cabinet below the tape drive unit (except Product Numbers 4550F or 4551F).
- The 315MB FMD is the only disk subsystem supported on the 2550/2655 in the office environment cabinet.
- If sufficient space is not available in existing peripheral cabinets, an additional peripheral cabinet must be ordered.

Expansion Rack-Mounted Disk Cabling

Additional cables are sometimes required when adding a second, third or fourth rack-mounted expansion disk to a 4005 or 6580 controller disk subsystem. This includes expansion disks added to new system orders in the field (as well as existing systems), both FCC and non-FCC configurations.

Expansion rack-mounted disks (315MB FMD, 496MB FMD, 160MB FMD, 32MB CMD, 64MB CMD and 96MB CMD) include a non-FCC cable with the limited capability of being used only inside the disk peripheral cabinet for connection to another rack-mounted disk in the same cabinet. Becaue the daisy chain cable must connect to the previous drive on the subsystem, this cable cannot be used when the previous drive is not in the same cabinet.

Additional cables are needed when the rack-mounted expansion disk is to be the first disk in a cabinet (computer room or office environment, FCC or non-FCC) which requires connecting the daisy chain cable to another disk outside the cabinet.

TABLE 2-11. CABINET-MOUNTED DISK SUBSYSTEM CONFIGURATION INFORMATION

Device/Capability	Selectable Product Number	Device Description
Controller, first drive capability, first disk drive, disk cartridge pack (CMD) and cable	4421F +	32MB CMD
	4431F +	64MB CMD
	4441F +	96MB CMD
	4481F +	160MB FMD
	4475F	315MB FMD
	4475L **	315MB FMD
	4475S ***	315MB FMD
Second drive capability, second drive*, disk cartridge pack (CMD) and cable	4422F +	32MB CMD
	4432F +	64MB CMD
	4442F +	96MB CMD
	4482F +	160MB FMD
	4476F +	315MB FMD
	4476L **	315MB FMD
	4476S ***	315MB FMD
Third drive capability, third drive*, disk cartridge pack (CMD) and cable	4423F +	32MB CMD
	4433F +	64MB CMD
	4443F +	96MB CMD
	4483F +	160MB FMD
	4477F	315MB FMD
	4477L **	315MB FMD
	4477S ***	315MB FMD
Fourth drive capability, fourth drive*, disk cartridge pack (CMD) and cable	4424F +	32MB CMD
	4434F +	64MB CMD
	4444F +	96MB CMD
	4484F +	160MB FMD
	4478F	315MB FMD
	4478L **	315MB FMD
	4478S ***	315MB FMD
Removable Disk Cartridge for CMDs	4325	16MB

NOTES: * Storage Module Drives (SMDs) and 675MB FMDs may be added to the cabinet-mounted subsystem as the second, third and fourth devices.

When part of a standard package, cabinet or cabinet-mounting is included.

** Note that the 315MB FMD mounts in the 7653L office peripheral cabinet, designated with -L suffix.

*** Note that the 315MB FMD mounts in the 7654S peripheral cabinet, designated with -S suffix.

Also note that -A must be appended to the product number for 220 VAC, 50Hz operation.

\+ Discontinued products.

TABLE 2-12. 496MB FMD CABINET-MOUNTED DISK SUBSYSTEM CONFIGURATION INFORMATION

Device/Capability	Selectable Product Number
Controller*, Left Disk Drive, Full Rack-Mounting Hardware, Cable	4735 (A, B, C)
Controller*, Right Disk Drive	4736 (A, B, C)
Left Disk Drive, Full Rack-Mounting Hardware	4737 (A, B, C)
Right Disk Drive	4738 (A, B, C)

* 496MB FMD requires the 6580 disk controller. The 6580 requires no controller upgrade for Drive 2-4.

A: Append Product Number with "S" for installation in 7564S peripheral cabinets, "F" for installation in FCC peripheral cabinets.

B: One controller and a maximum of two drives; one right, one left can be mounted in a FCC peripheral cabinet.

C: Append Product Number with "L" for installation in 7653L office peripheral cabinet.

NOTE: -A must be appended to the Product Number for 50Hz operation.

TABLE 2-13. SUBSYSTEM SPECIFICATIONS

SPECIFICATIONS	32MB Product Number 442X	64MB Product Number 443X	96MB Product Number 444X
Operating Characteristics			
Bytes per Drive (formatted)	30.8MB	61.6MB	92.4MB
Bytes per Sector	2080	2080	2080
Sectors per Track	9	9	9
Tracks per Drive	1646	3292	4938
Cylinders per Drive	823	823	823
Avg. Latency Time (msec)	8.3	8.3	8.3
Minimum Seek Time (msec)	6	6	6
Average Seek Time (msec)	30	30	30
Maximum Seek Time (msec)	55	55	55
Transfer Rate (bytes/sec)	1.2MB	1.2MB	1.2MB

SPECIFICATIONS	160MB Product Number 448X	315MB Product Number 4475	496MB Product Number 4735
Operating Characteristics			
Bytes per Drive (formatted)	151MB	292.7MB	496MB
Bytes per Sector	2080	2080	2080
Sectors per Track	9	9	14
Tracks per Drive	8210	15367	17064
Cylinders per Drive	821	823	711
Avg. Latency Time (msec)	8.3	8.3	8.33
Minimum Seek Time (msec)	10	6	<5
Average Seek Time (msec)	30	25	20
Maximum Seek Time (msec)	55	50	45
Transfer Rate (bytes/sec)	1.2MB	1.2MB	1.8MB

NOTE: The "dual port" option is not available with the CMD or 160MB FMD devices.

MAGNETIC TAPE SUBSYSTEMS

Prime's 50 Series systems (except the 2350 and 2450) support the magnetic tape transports shown in Table 2-14.

TABLE 2-14. MAGNETIC TAPE SUBSYSTEMS

Type of Drive	Tracks	Speed (IPS)	Format	Density	Controller Slots	Model Number
NRZI/PE/ GCR	9	50	NRZI/PE/GCR ANSI	800/1600/ 6250	1	4590S
NRZI/PE	9	75	NRZI/PE, ANSI	800/1600	2	4522S
NRZI/PE	9	45	NRZI/PE, ANSI	800/1600	2	4520F*
NRZI	9	45	NRZI, ANSI	800/556	1	4512F*
NRZI	7	45	NRZI, ANSI	800/556	1	4510F*
Streamer	9 9 9	100 50 25	PE, ANSI PE, Non-Std. PE, ANSI	1600 3200 1600	1	4560F 4560L 4660S 4560-2250 (Note 2)
Cartridge	4	30	MFM	6400	1	4581F 4581L (Note 1)
Cartridge	9	90	QIC-24	8000	1	4585F

Note 1: Subsystem available in packaged systems only on 2250 systems.

Note 2: Three speeds/two densities standard with device, and included in each model number.

* Note that these tape products have been discontinued.

Configuring New Systems

The following rules should be noted when configuring tape subsystems:

1. A maximum of two tape subsystems may be configured on one CPU system. The subsystems may be identical or different.

2. Table 2-16 shows a complete list of possible combinations; other combinations will not function because of different formatter and cable requirements. (The streamer is not included in this table due to lack of space.)

3. The additional transport Product Numbers include all cables and hardware necessary to install a tape transport. Cartridge and streamer transport types require cabinet space; other transports include a cabinet.

TABLE 2-15. ADD-ON MODEL NUMBERS

Transport Type	Product Number	Prerequisite
NRZI/PE	4529S	4520, 4520F, 4522, 4522F
NRZI/PE	4530S	4520F, 4522F, 4522S
NRZI/PE/GCR	4591S	4590, 4590F, 4590S, 4591, 4591F, 4591S
Cartridge Cartridge Cartridge	4582F 4583F 4584F	4581 or 4581F 4582 or 4582F 4583 or 4583F
Streamer Streamer Streamer Streamer	4561F 4561L 4661-2250 4661S	4560F/4561F 4560L 4660-2250 4660S
Also note that -A must be appended to the product number for 220 VAC, 50Hz operation.		

TABLE 2-16. POSSIBLE ADD-ON COMBINATIONS

ADD-ON	SUBSYSTEMS			
	NRZI/PE 4520, 4520F 4520S, 4522, 4522F 4522S	GCR 4590F 4590S 4550F	Cartridge 4581 4581F	Streamer 4561F 4660S
75 IPS, 9 Track NRZI/PE	4529S 4530S	No	No	No
GCR	No No	4591S 4551S	No	No
Cartridge	No No	No	4582F 4583F 4584F	No
Streamer	No No	No	No	4561F 4661S

Configuring Additional Drives on Existing Systems

The key to successfully configuring additional drives on an existing system is to understand what the customer currently has installed.

The add-on package differs, depending on what is already installed in the existing system. Ordering a package which is close, but not exactly correct, will result in installation delays due to improper cabling, missing adapters and other similar problems. This section provides information which ensures that the proper add-on package is ordered. Table 2-17 lists the set of Product Numbers which may be used to add-on to a system containing a 41XX tape subsystem. If the CPU contains a 45XX tape subsystem, additional transports are ordered using one of the models listed in Tables 2-15 and 2-17. The following points are worth noting about Table 2-17:

1. Additional transports for subsystems 4170, 4171 and 4180 do not require specification of which transport is being ordered (second, third or fourth).

2. Additional transports to a 4190 subsystem must specify which transport is being added (second, third or fourth).

TABLE 2-17. ADD-ON NUMBERS FOR OLD PRODUCTS						
Product Number	Tracks	Speed	Format	Density	Comment	Prerequisite Subsystem ID
4521S	9	75	NRZI/PE	800/1600		4180
4542S	9	75	NRZI/PE	800/1600	2nd Drive	4190

Table 2-18 illustrates an add-on option, and can be used to select the correct Product Number for any customer.

TABLE 2-18. ADD-ON OPTIONS				
Installed Subsystem / Add-On	7 Track 4170	NRZI Only 9 Track 4171	45 IPS NRZI/PE 4180	75 IPS NRZI/PE 4190
9-Track NRZI/PE 75 IPS	No	No	4521S	4542S

Ordering Examples

Example A:

Customer "X" requires two 75 IPS NRZI/PE drives on a system being ordered.

Configuration:

One 4522S subsystem and a 4530S add-on package (refer to Tables 2-14 and 2-15).

Example B:

Customer "Y" wants to add a second 75 IPS NRZI/PE drive to an existing 550 system (delivered before December 1980).

Configuration:

Since the customer has a 75 IPS NRZI/PE drive installed before December 1980, it must be a 4190 tape subsystem. The correct add-on in this case, found in Tables 2-15 and 2-16, is a 4542S.

Example C:

Customer "Z" has a 750 system delivered in Q1 of 1981, but doesn't know what type of 75 IPS NRZI/PE subsystem is installed, and wants a second 75 IPS NRZI/PE transport.

Configuration:

Check shipping documentation and work with Customer Services to determine whether the customer has a 4190 or 4522 installed. Order accordingly (Table 2-14 or 2-15).

CARTRIDGE TAPE SUBSYSTEMS

2250

The 2250 system supports up to two cartridge tape subsystems. This maximum configuration is only supported when the 4651-2250 subsystem and the 4585F subsystem are both installed. No more than one of each of these two cartridge tape subsystems may be configured. The 4651-2250 subsystem supports a maximum of two cartridge drives, and the 4585F subsystem supports a maximum of one cartridge drive. The 4585F subsystem requires PRIMOS Rev. 20. or later.

Configuration Rules

Note the following rules when configuring cartridge tapes on a 2250 system:

1. A maximum of two subsystems and three drives is allowed on a 2250 system as noted above.

2. The disk/tape controller is standard equipment on all 2250 systems with 68MB/158MB disk drives, but is not standard equipment on Model 2250-019. Certain 2250 models are packaged with the first cartridge drive. The 4585F subsystem requires a separate unique controller which takes up an additional chassis slot.

3. The 2250 central cabinet houses up to two drives. The 4585F subsystem comes with its own cabinet.

4. Table 2-19 shows basic specifications and Product Numbers.

TABLE 2-19. 2250 CARTRIDGE TAPE SUBSYSTEM SPECIFICATIONS

Product Number	Device	Speed (IPS)	Format	Density (BPI)	Controller Slots	Prerequisite
*	First	30	MFM	6400	1	2250
4651-2250	Add-On	30	MFM	6400	-	2250
4585F	Add-On	90	QIC-24	8000	1	2250

* 2250 systems include a dual-function disk/tape controller that supports up to two cartridge drives. If a cartridge tape is required, it should be ordered with the original system.

2350 and 2450

Each Prime 2350 and 2450 system supports one cartridge tape subsystem. This subsystem is housed in the central system cabinet. No additional cartridge tape drives may be added to this initial configuration.

2655

The 2655 system supports up to two cartridge tape subsystems. This maximum configuration is only supported when the 4581L subsystem and the 4585F subsystem are both installed. No more than one of each of these two cartridge tape subsystems may be configured. The 4581L and the 4585F subsystems support a maximum of one cartridge drive. The 4585F subsystem requires PRIMOS Rev. 20 or later.

Configuration Rules:

The following rules should be noted when configuring cartridge tape drives for 2655 systems.

1. A maximum of two subsystems and two drives is allowed on a 2655 system as noted above.

2. The 4581 cartridge tape subsystem is housed in the 2655 office peripheral cabinet, and the 4585F subsystem comes with its own cabinet.

3. The controller requires one slot in the I/O backplane.

4. The controller, device and cables are packaged as Prime Model Numbers 4581L and 4585F. Cabinet space must be provided for the 4581L device.

All Other Prime 50 Series Systems (not 2X50)

1. Up to two cartridge tape subsystems are permitted, with up to four devices on the 4581 subsystem controller, and one device on the 4585F subsystem controller. No more than one 4581 or 4585F subsystem controller may be configured. The 4585F subsystem requires PRIMOS Rev. 20 or later.

2. The controller requires one slot in the I/O backplane.

3. The 4581F subsystem controller, first device and cables are packaged as Prime Model Number 4581F. Cabinet space must be provided for the device. The 4585 subsystem controller, device, cables and cabinet are packaged as Prime Model Number 4585F.

4. Second, third and fourth 4581 add-on devices are, respectively, 4582F, 4583F and 4584F. Cables are supplied, but cabinet space must be provided for the devices.

STREAMING MAGNETIC TAPE SUBSYSTEM

The Prime Streaming Magnetic Tape Subsystem can be configured on any 50 Series machine running PRIMOS at Rev. 19.2 or later. This requirement may be further restricted by system guidelines. Refer to Section 1 for each system's PRIMOS requirements.

2250

Models 4660-2250 and 4661-2250 are designed specifically for the Prime 2250. Model 4660-2250 subsystem includes a Prime 2250-style cabinet, single-board streaming controller, device and cable. The second device, Model 4661-2250, is mounted in the first device cabinet. Each Prime 2250 system can support one streaming tape subsystem. The subsystem supports a maximum of two streaming drives. 2250 disk drives and streaming tapes cannot be mixed in the same 2250 cabinet.

Configuration Rules:

1. 2250 systems may have a maximum of one streaming tape controller.

2. The single-board controller is included on a 2250 system packaged with streaming tape.

3. The 2250 streaming tape cabinet houses up to two drives.

2350 and 2450

The Streaming Magnetic Tape Subsystem may be ordered as an option to any 2350 or 2450. The product selection number for this option is 4660T. This device comes with its own peripheral bay cabinet and controller, which means that one of the central system option slots must be used to support this tape drive. Only one optional device is supported.

2655

The device is rack-mounted on the 2655. The subsystem consists of a single-board streaming controller, device and cables. Note that the subsystem does not include a cabinet. A maximum of one streaming tape controller and two streaming devices are supported on the 2655. Order Model 4560L for the subsystem and 4561L for the add-on device.

Configuration Rules:

1. If no cabinet is available, cabinet Model 7653L must be ordered separately.

2. The 2655 system may have a maximum of one streaming tape controller and two streaming tape drives.

3. The single-board controller is included on a 2655 packaged with streaming tape.

4. The 2655 office peripherals cabinet houses up to two drives.

50 Series Systems (except 2250, 2350, 2450 and 2655)

This device is rack-mounted in a 50 Series Option Cabinet. The Model 4560F and 4660S subsystem includes the drive and controller, but no cabinet. Up to three drives can be configured per controller, with a maximum of two controllers per 50 Series system. Up to three drives can be mounted in the 7561F option cabinet, up to four in the 7564S. One streaming tape drive may be mounted below a 75 IPS or Model 4590/91/51 GCR magnetic tape device. Streaming tape drives cannot be mounted below a Model 4550 GCR magnetic tape devicee.

Configuration Rules:

1. The subsystem does not include a cabinet.

2. Up to three drives can be configured on a single controller. Non-2250/2550 systems support a maximum of two tape controllers of any combination (GCR, PE/NRZI, streamer, etc.).

3. A maximum of three drives can be mounted in the 7651F peripheral cabinet, four in the 7564S cabinet. One streaming drive may be mounted below a 75/45 PE/NRZI tape drive.

4. Streaming tape drives cannot be mounted below Model 4550 GCR tape drives.

TABLE 2-20. STREAMING MAGNETIC TAPE SUBSYSTEM

Speed (IPS)	Density (BPI)	Format
25 50 100	1600 3200 1600	PE, ANSI PE PE, ANSI

Product Number	Device	Controller Slots	Prerequisites
4560F	First	1	50 Series system, (exc. 2250-2655), 7561F cabinet space
4560L	First	1	2655 system, cabinet space
4660S	First	1	50 Series system, (exc. 2250-2655), 7564S cabinet space
4660-2250	First	1	2250 system
4660T	First	1	2350 and 2450 systems
4561F	Add-on		4560F, FCC cabinet space
4561L	Add-on	-	4560L, cabinet space
4560S	Add-on	-	4560S, cabinet space
4661-2250	Add-on	-	4660-2250

Also note that -A must be appended to the product number for 220 VAC, 50Hz operation.

PE/NRZI TAPE SUBSYSTEM

All 50 Series Systems (not for 2350 and 2450)

1. There are two controllers available: a two-board controller for PE/NRZI transports and a single-board controller for NRZI-only transports.

2. The maximum number of tape controllers per CPU system is two.

3. PE/NRZI transports are available at 75 or 45 ips speeds.

4. NRZI transports are available in 7-track or 9-track.

5. The first device includes controller, transport, cables and cabinet.

6. Add-on devices, to a maximum of four total devices per controller, include cables and cabinet.

7. There is space available in the cabinets for one additional peripheral.

8. Examine "prerequisites" column in the price book carefully to make sure the correct add-on tape transport is being ordered.

PE/GCR TAPE SUBSYSTEM

2250/2350/2450

The high-performance PE/GCR tape subsystem is not available on this system, nor is GCR available for the 2350/2450 systems.

Other 50 Series Systems (including the 2655)

1. First device (4590S) includes controller, formatter, tranport, cables and cabinet. Extra space is provided in the cabinet for mounting additional peripherals.

2. Three additional add-on devices (4591S) are permitted, each supplied with cables and a cabinet. Space below the add-on drives is provided for mounting peripherals.

3. The maximum number of tape controllers per CPU system is two (of any type).

4. The PE/GCR tape controller cannot be used with PE/NRZI transports, streamers or cartridges.

5. For earlier (4550F) GCR subsystems, up to three add-on devices (4551S) are permitted, each supplied with cables and a cabinet. There is space below the add-on drives for mounting peripherals.

UNIT RECORD SUBSYSTEMS

Unit record subsystems can be configured on any of the 50 Series systems, except for the 2350 and 2450 systems (URC devices are not supported by these systems), and can support a variety of line printers and a 300 card-per-minute (CPM) card reader. Some of the line printers supported include 200 LPM up to 1,000 LPM, with 64- or 96-character sets.

Each unit record subsystem is capable of supporting up to two line printers and one card reader. No more than two line printers can be supported by each subsystem, and there can be no more than two unit record subsystems with any of the 50 Series systems.

More detailed information is provided in Table 2-21, and in the 50 Series systems description in Section 1. Specifications are provided in Tables 2-22, 2-23 and 2-24.

TABLE 2-21. UNIT RECORD SUBSYSTEM CONFIGURATION INFORMATION

Device/ Capability	Selectable Product Number	Description
Controller and First Device	3320-2250, 3320F	300 LPM, 64 character, band
	3330-2250, 3330F	600 LPM, 64 character, band
	3166F	1,000 LPM, 64 character, chain
	3324-2250, 3324F	200 LPM, 96 character, band
	3173-2250, 3173F	300 LPM, 96 character, matrix
	3334-2250, 3334F	450 LPM, 96 character, band
	3167F	750 LPM, 96 character, chain
Second or Third Device*	3322-2250, 3322F	300 LPM, 64 character, band
	3332-2250, 3332F	600 LPM, 64 character, band
	3168F	1,000 LPM, 64 character, chain
	3326-2250, 3326F	200 LPM, 96 character, band
	3174-2250, 3174F	300 LPM, 96 character, matrix
	3336-2250, 3336F	450 LPM, 96 character, band
	3172F	750 LPM, 96 character, chain
	3159F	300 CPM, card reader, 80 column

* NOTE: The three devices supported by the Unit Record Subsystem may only consist of two printers and one card reader.

NOTE: A -A must be appended to the type number for 220 VAC, 50Hz operation.

TABLE 2-22. CHAIN PRINTER SPECIFICATIONS

First Device (Product Number) Second Device (Product Number)	3166F 3168F	3167F 3172F
Operating Characteristics:		
Operating Speed	1,000 LPM	750 LPM
Printing Technique	Chain	Chain
Character Set (ASCII)	64	96
Paper Advance (Slew Rate)	40 IPS	40 IPS
Form Feed Method	Tractors	Tractors
Horizontal Character Spacing (char/inch)	10	10
Form Widths (inches)	3.5 - 19.5	3.5 - 19.5
Characters/line (max.)	132	132
Lines/inch, vertical	6 or 8	6 or 8

TABLE 2-23. BAND PRINTER SPECIFICATIONS

Operating Characteristics	Product Number 3320F/3320F 3320-2250 3322-2250	3324F/3326F 3324-2250 3326-2350	3330F/3332F 3330-2250 3332-2250	3334F/3336F 3334-2250 3336-2250
Character Set	64 char.	96 char.	64 char.	96 char.
Print Rate (lines/min)	300	200	600	450
Print Columns	132	same	same	same
Horizontal Spacing	10 char/in	same	same	same
Vertical Line Spacing (switch selectable)	6-8 lines/in	same	same	same
Line Advance Time	25 msec	same	same	same
Paper Slew Speed	15 in/sec	same	same	same
Form Width	3 to 16 in 7.6 to 40.6 cm)	same	same	same
Format Control	electronic, 12 channel VFU	same	same	same
Paper Type	continuous fanfold, edge hole punched	same	same	same
Min. Paper Weight	15 lb bond	same	same	same
Multipart Forms	up to 6 parts	same	same	same
	12 lb bond, single-shot	same	same	same
	8 lb carbons			
Ribbon System	cont. loop	same	same	same
length	50 yds (15 m)			
width	1 in (2.6 cm)			
Band Life (impacts per character)	30 million (NOTE 1)	same	same	same
Ribbon Life (in characters)	20 million (NOTE 2)	same	same	same

NOTE 1: Based on all characters and printing done with standard 15 lb paper.

NOTE 2: The number 20 million characters roughly equates to 15,000 pages of typical EDP-type printing.

TABLE 2-24. CARD READER SPECIFICATIONS (3159F)	
Specifications	Description
Operating Characteristics: Number of Columns Reading Speed Hopper/Stacker Capacity	 80 300 CPM, maximum 550 cards of 7 mil thickness

SERIAL INTERFACE DEVICES

Printers requiring serial interfaces to connect to the VCP, AMLC, or ICS1/2/3 are not part of unit record subsystems. Table 2-25 provides information on serial interface devices.

TABLE 2-25. SERIAL INTERFACE DEVICES		
Product Number	Requirements	Description
3115F	VCP, AMLC, or ICS1 or ICS2/3	30-60, serial matrix, keyboard
3126F	AMLC, ICS1/2/3	300 LPM/96 char, matrix LP/plotter
3350F	AMLC, ICS1/2/3	200 CPS (bidirectional), receive-only, serial matrix
3351F	AMLC, ICS1/2/3	200 CPS (bidirectional), keyboard send/receive, serial matrix
3185	AMLC, ICS1/2/3	55 CPS (bidirectional), 96 char, letter quality printer

PAPER TAPE DEVICE CABLE REQUIREMENTS (Not available with FCC-compliant systems)

Cables for the Paper Tape Reader and Paper Tape Reader/Punch devices are not supplied with the devices and must be ordered as a separate line item. The Product Number 3006 controller is required for the Paper Tape devices, and must be ordered separately.

TABLE 2-26. PAPER DEVICE CABLE REQUIREMENTS

Device	Cables(s) Required
Paper Tape Reader (Product No. 3121)	CBL1451
Paper Tape Reader/Punch (Product No. 3122)	CBL1432 and CBL1451
Paper Tape Reader/Punch (Product No. 3123)	CBL1432 and CBL1451

SECTION 3

SOFTWARE CONFIGURATION REQUIREMENTS

All 50 Series systems offer a complete set of sophisticated software development tools. A number of industry-standard language compilers, text editors, utilities, data management and data communications software products are available.

OPERATING SYSTEM

PRIMOS is required to operate any 50 Series, P350, P400 or P500 CPU. A minimum of 1/2MB of physical memory is required. The license to use PRIMOS (executable) is included in the purchase price of any Prime CPU. See "PRIMOS Licensing" below for specific details on PRIMOS licensing.

PRIMIX is available for those users requiring UNIX functionality on Prime hardware. PRIMIX is co-resident with PRIMOS, and thus allows a synergetic relationship between the two operating systems. PRIMIX requires PRIMOS Rev. 19.4.5 or later. For more information on PRIMIX, please refer to the PRIMIX Sales Guide (SOU-7113-000).

PRIMOS Licensing

The price of all system packages includes an execute-only license to PRIMOS. Older system packages also included a source license bundled with the system. Upgrades to the 2350, 2450, 9655, 9755 and 9955 II will NOT include the cost of re-licensing PRIMOS Source Code. Because of this, customers upgrading to these systems will not be receiving PRIMOS Source Code in their upgrade packages. If a requirement exists for PRIMOS Source Code, or PRIMOS Utilities Source Code, it must be purchased as a separate line item (order model numbers 8503A-P or 8503B-P).

Customers who have previously purchased PRIMOS Source Code as a separate line item (NOT bundled with the system), will be relicensed when they upgrade to a new system, at no extra charge.

Please refer to PPA 320 for additional information on ordering PRIMOS Source Code and Source Code maintenance charges.

LANGUAGES & PROGRAMMING AIDS

Prime currently supports PRIMOS Revisions 19.4 and 20.0. All of the following languages and programming aids are supported on these revisions.

A number of high-level language compilers and program development products may be ordered with any 50 Series system. These include FORTRAN-77, FORTRAN-66, BASIC/VM, PL/I, PL/I Subset G, Pascal, COBOL-74, C and RPG II. Program and system development aids include the Source Level Debugger, the Forms Management System (FORMS) and the EMACS Programmable Full Screen Editor.

FORTRAN-77 (F77) - ANS X3.9-1978

FORTRAN-77 supports compilation and execution of programs on any properly configured 50 Series system.

FORTRAN-66 (FTN)

FORTRAN-66 supports compilation and execution of programs on any properly configured 50 Series system.

BASIC/VM (BASICV) - ANS X3.60-1978

BASIC/VM supports compilation and execution of programs on any properly configured 50 Series system.

PL/I - ANS X3.53-1976

PL/I supports compilation and execution of programs on any properly configured 50 Series system.

PL/I Subset G (PLIG)

PL/I Subset G supports compilation and execution of programs on any properly configured 50 Series system.

COBOL-74 (CBL) ANS X3.23-1974

COBOL-74 supports compilation and execution of programs on any properly configured 50 Series system.

RPG II

RPG II supports compilation and execution of programs on any properly configured 50 Series system.

Pascal - ANSI/IEEE 770X3.97-1983

Pascal supports compilation and execution of programs on any properly configured 50 Series system.

LANGUAGES & PROGRAMMING AIDS (continued)

C

C supports compilation and execution of programs on any properly configured 50 Series system.

Source Level Debugger (DBG)

The Source Level Debugger is a language-independent debugging tool. It will operate on any properly configured 50 Series system. The Source Level Debugger can be used with C, COBOL-74 (CBL), FORTRAN-66, FORTRAN-77, Pascal, PL/I, PL/I Subset G, and the RPG II Compiler.

Prime EMACS

Prime EMACS is a, full screen display editor, useful for both text entry and programming. It will operate on any properly configured 50 Series system and has special FORTRAN, COBOL and RPG modes.

Prime EMACS is compatible with all Prime terminals (in character-mode) and with many other terminals.

CORE DATA MANAGEMENT PRODUCTS

Core Data Management products available with the 50 Series systems include the data managers: MIDASPLUS, PRISAM, Prime ORACLE and Prime DBMS. Supporting query and reporting products include: DISCOVER and PRIME/POWER+. For forms creation and management, FORMS and FORMS with FED, complete Prime's Core Data Management product offerings.

MIDASPLUS (Multiple Index Data Access System)

MIDASPLUS is a data management software system that will operate on any properly configured 50 Series system. It allows the creation of and access to multi-key files, either directly or through program interface.

MIDASPLUS requires Rev. 18.3 or later of PRIMOS. MIDASPLUS files are accessible to application programs written in FORTRAN 66, FORTRAN 77, COBOL, COBOL 74, BASIC/VM, PL1/G (with single-key support), Pascal, C, RPG II Interpreter and the RPG II V-Mode Compiler. MIDASPLUS data can also be accessed through the PRIME/POWER+ query product. It requires .75MB of memory, plus 1MB per 24 active users using program interface.

When properly positioned, MIDASPLUS offers the best performance of all Prime's data management products. It is highly competitive with other vendor's similar ISAM offerings.

PRISAM (Prime's Recoverable Index Sequential Access Method)

The PRISAM product is a recovery-based, simple ISAM data modeler. It has been designed for the application that requires all the benefits of a transaction-oriented data manager, without the complexity of a DBMS. It utilizes the same Recovery-Oriented Access Method (ROAM) to manage recovery and concurrency contral as Prime DBMS.

A good guideline for configuring PRISAM is .75MB of main memory, plus 1MB of memory for each 8-10 users. PRISAM supports indexed, sequential and relative files. Access to these files is provided through COBOL using high-level COBOL statements, through a call-level interface to any Prime language that supports calls, and through the DISCOVER query and report writer.

PRISAM runs on any properly configured 50 Series system, and requires Rev. 19.2.7 or later of PRIMOS.

CORE DATA MANAGEMENT PRODUCTS (continued)

Prime ORACLE

Prime ORACLE is Prime's new fully relational database management system, based on IBM's SQL language syntax. When properly configured, Prime ORACLE runs on all 50 Series systems, as well as on the PERFORMER PC Option, and IBM PC/XT and PC/ATs.

The English-like, non-procedural and multi-function SQL language provides layers of increasing complexity, thus supporting both simple end-user database queries, and providing a basis for production application development. All SQL functions can be used interactively from the terminal, or imbedded in programming languages such as FORTRAN, COBOL or C.

Prime ORACLE for the 50 Series requires PRIMOS Rev. 19.4 or later. Initial experiences suggest that Prime ORACLE users should allow up to .75MB of main memory for the kernal, plus an additional .2MB per user beyond normal requirments for the operating system and other software.

Prime ORACLE for the PC requires MS-DOS/PC-DOS Rev. 2.1 or higher, with 512KB of main memory and 5MB of hard disk storage.

For additional information regarding Prime ORACLE, please refer to the Prime ORACLE Sales Guide (SOU-7304-000), the 50 Series Announcement (PPA 309R), the PC Announcement (PPA 314) and the Configuration/ Performance Marketing Notice (PMN 310).

Prime DBMS (Database Management Systems)

Prime DBMS runs on any properly configured 50 Series system and requires Rev. 15 or later of PRIMOS. It uses the Recovery-Oriented Access Method (ROAM) to manage recovery and concurrency control. Prime DBMS with ROAM runs only at Rev. 19.2.7 and later of PRIMOS.

A rule of thumb for Prime DBMS configuration is that it requires 1MB of main memory, plus approximately 100KB per user. Performance of Prime DBMS applications tends to be sensitive to changes in CPU model.

The 2350 and 2450 systems must be configured with the Streaming Magnetic Tape Drive option in order to take full advantage of the ROAM facility, and to maximize performance. DBMS will not be supported by the cartridge tape drive embedded in the 2350 and 2450.

Prime DBMS is compatible with the Prime host languages FORTRAN and COBOL.

PRIME/POWER+

PRIME/POWER+ is a user-oriented data query and reporting language that runs on any properly configured 50 Series system. It is based on an English language command system designed for on-line data management, and is designed as an end-user tool for ad hoc queries and non-production reporting.

PRIME/POWER+ requires Rev. 16 or later of PRIMOS. It will support MIDAS, MIDASPLUS, SAM and DAM file types. It requires a minimum of .75MB of main memory, plus 1MB of memory per 20 PRIME/POWER+ users.

PRIME/POWER+ is memory and CPU performance sensitive; therefore, be sure that adequate CPU and memory are available for customers who plan to use it. In addition, PRIME/POWER+ users may tend to use more disk storage than initially anticipated. Be sure that the user orders an adequate number of disk devices.

FORMS and FORMS FED (Forms Management System)

The Forms Management System (FORMS) supports compilation and execution of programs on any properly configured 50 Series system with the appropriate terminals. FORMS applications can be developed for PT200s, OWL 1200s, PT45s, IBM 3277s or other terminals. FORMS requires Rev. 15 or later of PRIMOS.

FORMS can communicate with applications written in any of the standard Prime languages, including FORTRAN 66, FORTRAN 77, COBOL, COBOL 74, RPG II, PLI/G and Macro Assembler.

FORMS Editor (FED) is a forms creation facility. It can be used with the PT45 and PRIMOS Rev. 18.2. or later. FED is also available for use with the PT200 and PRIMOS Rev. 19.4 or later. For additional information on Data Management products, please refer to the Data Management Comprehensive Sales guide (SOU-7301-000).

PRIMEWAY Transaction Development and Management System

The PRIMEWAY Transaction Development and Management System provides the data processing departments of large companies with the tools necessary to build, run and maintain online transaction processing applications. Integrated with PRIMEWAY are COBOL, Prime DBMS, PRISAM and PRIMENET, as well as many very powerful tools for the development and maintenance of online transaction systems (especially Distributed Transaction Processing Applications).

By providing prototyping, data management, forms handling, networking, code generation, automated librarian and documentation, a transaction processing monitor, administrative tools, extensive security, and built-in recovery among its many features, PRIMEWAY helps the customer to achieve significant programmer and processing productivity. The Integrated Development Environment of PRIMEWAY allows the customer to better control their development; cut the length of the development cycle, and produce a better system. This environment also provides the control, documentation and tools to reduce the time and effort of maintaining these systems. The distributed transaction processing capabilitites of PRIMEWAY not only significantly increase the productivity of developing such systems, but also the facilities to run the application in a distributed, recoverable fashion.

For traditional transaction processing applications, PRIMEWAY provides a very competitive solution for companies with revenue in excess of $100 million, as well as Federal, State and large city government.

For additional marketing information on PRIMEWAY, please refer to the Data Management Comprehensive Sales Guide (SOU-7301-000) and the PRIMEWAY Sales Guide (SOU-5204-000). The Introduction to PRIMEWAY Manual (DOC 8973-1PA) is an excellent reference, as well as sales, tool. Further assistance may also be obtained by calling the PRIMEWAY Marketing Group in Prime Park.

Prime INFORMATION

Prime INFORMATION is a fourth-generation, relationally-based, fully-distributed data management product. It offers a highly-productive environment, designed to aid the end-user and application developer alike. It also provides a structured data entry facility, a powerful English-like query language, an integrated data dictionary, a user-defined vocabulary, a powerful high-level programming language (INFO/BASIC) and an extensive on-line help facility. The file structure features hashed keyed access to data records, support for single-valued and multi-valued fields, and variable length data storage at all levels.

SIMPLE and CONNECTION are complementary products to Prime INFORMATION. SIMPLE is an application development and prototyping tool with sophisticated functions, such as cross-reference file creation and maintenance, formatted data entry screens, local and remote database update and backout, customized reports up to 132 columns and automated documentation.

CONNECTION is a decision support system that contains word processing, spreadsheet and graphics modules, all fully-integrated among themselves and with Prime INFORMATION.

Prime INFORMATION runs with PRIMOS on the entire 50 Series family. The 2350, 2450, 2655 and 9655 also offer microcode that improves its performance. New functionlity on Release 6.0 includes the ability to call subroutines written in languages other than INFO/BASIC, a MIDASPLUS interface, new internationalized date and monetary formats, support for the PT200 terminal and recovery assist. PRIMOS Rev. 19.1, 19.2 and 19.3 require Release 5.4 of Prime INFORMATION. The minimum configuration would consist of a Prime 2350 with 2MB memory and two 60MB disk drives. The 9955 can be configured with 8-16MB memory and 4-8MB disk drives (at least two disk controllers), with support for between 64 and 200 users.

In the U.S., Prime INFORMATION is sold through our direct sales force and indirect sales channels. Outside the U.S., it is sold directly through our subsidiaries and international Distributors.

A wide variety of off-the-shelf application software is available from third party vendors for virtually any vertical market or horizontal application.

For additional information about Prime INFORMATION, please refer to the Prime INFORMATION Sales Guide (SOU-5101-000).

OAS (Office Automation System)

Prime's Office Automation System (OAS) addresses the broad-range of tasks that are an essential part of most offices. It combines electronic mail, appointment scheduling, word processing, and electronic filing and retrieval in one integrated software package.

OAS is composed of three menu-driven modules: Management Communications and Support (MCS), Word Processing (WP) and Advanced Text Management (ATM). MCS helps office workers distribute documents and notes, arrange schedules, make appointments and produce a variety of reports. WP is designed for creating or modifying documents of any size, and ATM provides further word processing capabilities, including proofreading and automatic hyphenation.

Other features of OAS include a powerful import/export capability, allowing text and data to be easily moved between office automation and data processing environments. It provides access to Prime Timer, which displays a three-month calendar and 24-hour clock, and scans the intray notifying users of new mail. The Timer can also send alarms and "ticklers" to remind users of important events or upcoming meetings.

OAS is also integrated with other products. Prime INFORMATION data can be directly incorporated into an OAS document, taking advantage of OAS list processing facilities. OAS documents can also be transferred in an editable format to the PERFORMER workstation for word processing.

OAS will run on any properly configured 50 Series system. The following terminals and workstations support OAS: PT200, PST100, PT65 and PT45 terminals, and the PERFORMER and PRODUCER workstations. All are designed to increase the flexibility and ease-of-use of Prime OAS, provide access to such facilities as communications and data processing, and act as a window into the 50 Series computer systems.

SECTION 4

COMMUNICATIONS HARDWARE, CABLES AND SOFTWARE

This section includes information related to communications hardware, cables and software. Information on Terminals is found in Section 2. For your convenience, a description of each product and its functions are included. Revision dependencies are listed, along with configuration information for related products.

COMMUNICATIONS HARDWARE SUBSYSTEMS

Prime offers several different communications hardware subsystems for the 50 Series which can be configured in a variety of ways. Generally, the use of one communications hardware subsystem does not preclude the addition of another or more advanced subsystems in the future. This compatibility protects the customer's investment and allows an easy upgrade path to state-of-the-art communications capabilities. Table 4-1 shows the communications hardware subsystems currently available:

TABLE 4-1. COMMUNICATIONS HARDWARE SUBSYSTEMS

SUBSYSTEM		COMMUNICATIONS TYPE *
Intelligent Communications Subsystem/3	(ICS3)	sync, async
Intelligent Communications Subsystem Model/2	(ICS2)	sync, async
Intelligent Communications Subsystem Model/1	(ICS1)	sync, async
Asynchronous Multi-Line Controller	(AMLC)	async
Multi-Line Data Link Controller	(MDLC)	sync
PRIMENET Node Controller	(PNC)	RINGNET

* sync - synchronous communication
async - asynchronous communication
RINGNET - Provides RINGNET Local Area Network support

This section covers the following aspects of hardware communications subsystems:

1. Features and Functions
2. Configuration Information
3. Housing Information

Features and Functions

Briefly review the information contained in Table 4-2, as the material is referenced frequently throughout the remainder of this section.

Please note the keys in Table 4-2 (i.e., a1, b1, and d3). These keys reference, later in this section, which controllers support different communications products, CPUs, protocols and line speeds.

TABLE 4-2. COMMUNICATIONS CONTROLLERS		
INTELLIGENT COMMUNICATIONS SUBSYSTEM CONTROLLERS		
Product Number	Key	Provides:
5181 5181FP 5181F 5181L 5181-2250 5181T	a1 a1 a1 a1 a1 a1	ICS1: Support for (8) V.24/RS232 async and (1) V.24/RS232 sync line. Requires PRIMOS Rev. 19.1 or later. PRIMOS Rev. 19.1 (2780/3780/HASP); PRIMOS Rev. 19.3 (X.25 full-duplex HDLC PRIMENET).
5242 5242F 5242L 5242S	b1 b1 b1	ICS2: Async-only version. Basic configuration supports (16) V.24/RS-232 async lines; can be expanded to support 64 async lines. Requires PRIMOS Rev. 19.2 or later. Not available for 2350 or 2450.
5725 5725L 5725F 5725FP 5725-2250	f1 f1 f1 f1 f1	ICS3: ICS3 model with ICS2-style card cage. Order async and sync CLAC204/502/522s to make operational. Requires PRIMOS Rev. 20.1. Not for use in 2350/2450 systems or 7564S peripheral cabinets.
5730T	f2	8-slot version that mounts in 2350 and 2450 system cabinets. Use CLAC304/602/ or 622s to make operational. Requires PRIMOS Rev. 20.1.
5735S	f3	16-slot version that mounts directly on the 7564S peripheral cabinet. Use CLAC304/602 or 622s to make operational.
PRIMENET NODE CONTROLLER II (PNC II)		
7042 7042F 7042L 7042-2250 7042T	c1 c1 c1 c1 c1	PRIMENET Node Controller (PNC) for use in creating a RINGNET network. Allows a PRIMENET system to connect with up to 128 other PRIMENET systems over a 10m bps LAN, using token pass control. Includes internal cabling and standard RINGNET junction box. RINGNET twin-ax cable for interconnecting each system must be ordered separately.
-continued on next page-		

TABLE 4-2. COMMUNICATIONS CONTROLLERS (continued)

AMLC CONTROLLERS		
5154 5154F 5154-2250 5154L 5154FP 5154T	d1 d1 d1 d1 d1 d1	(16) V.24/RS-232 high-performance async lines. Speeds up to 19,200 bps with standard data set control. Suitable for connecting full-duplex modems, terminals and serial printers. Requires PRIMOS Rev. 15 or later.
5174 5174F 5174-2550 5174L 5174FP	d2 d2 d2 d2 d2	(16) 20-milliamp (ma) current-loop async lines. Speeds up to 19,200 bps. Suitable for connecting terminals (tty-type) and serial printers. Requires PRIMOS Rev. 15 or later.
5175 5175F 5175-2250 5175L 5175FP	d3 d3 d3 d3 d3	(8) V.24/RS232 and (8) 20ma current-loop async lines. Combination of AMLC 5154 and AMLC 5174 interfaces. Requires PRIMOS Rev. 15 or later.
MDLC Controllers		
5602 5602F 5602-2250 5602L 5602T	e1 e1 e1 e1	(2) V.24/RS232 sync lines. Speeds up to 19,200 bps. Used to interface to most synchonrous modems and devices. One firmware option kit must be ordered for each MDLC. Requires PRIMOS Rev. 16.4 or later.
5622 5622F 5622L 5622T	e2 e2 e2	(2) V.35/DDS sync lines. Speeds up to 64,000 bps. Interfaces with high-speed data adapter units, devices and satellite networks. Order one firmware protocol option kit with each MDLC. Requires PRIMOS Rev. 16.4 or later.
MDLC SUBSYSTEM OPTIONS		
5604	e3	2-line expansion kit for 5602 or 5622. Provides two additional VS.24/RS232C lines. Must be factory installed when 5622 or 5602 is ordered. Not available on the 2350 or 2450.
5624	e4	2-line expansion kit for 5602 or 5622. Provides two additional V.35/DDS lines. Must be factory installed when 5622 or 5602 is ordered. Not available on a 2250, 2350 or 2450.

- continued on next page -

TABLE 4-2. COMMUNICATIONS CONTROLLERS (continued)		
MDLC SUBSYSTEM OPTIONS		
The following options provide on-board firmware support for protocol mixes. The protocols are installed at the factory and must be ordered with the MDLC. See the Communications Software section for information regarding firmware options for each product.		
5646	e5	Bisync (2780/3780/HASP; DPTX; Half-duplex PRIMENET) and HDLC protocols
5650	e6	Bisync and 200UT and Univac 1004 and ICL 7020 and XBM and T$SLC protocols.
5651	e7	HDLC and 200UT and Univac 1004 and ICL 7020 and XBM protocols
5654	e8	Bisync and GRTS protocol
NOTE: Model numbers are explained on following page		

One or more suffixes appended to the model number indicates the style of the cabinet and its electrical requirements. It is important to use the correct suffix to indicate the type of cabinet a subsystem will be housed in; this assures that the correct internal cables and mounting hardware are shipped with the system.

Valid first and second suffixes are:

First Suffixes

There are now seven first suffixes for communication controller Product Numbers. These are described below, where XXXX depicts the base four-digit Product Number. Note that the correct suffix ensures that the proper internal cabling and I/O bulkhead connection are supplied.

1) XXXX

No suffix: Used when ordering communications controllers for systems in non-FCC compliant cabinets. Systems for which this Product Number should be used are limited to all non-FCC compliant systems. All systems shipped before July 12, 1983 were non-FCC compliant.

2) XXXXF

"F" suffix: Used when ordering communications controllers for systems in FCC-compliant cabinets (except 2250, 2550 and 2655) which DO NOT support modular panels. Systems shipped between July 12, 1983 and January, 1985 do not support modular panels. More information on cabling is provided later in this section.

3) XXXXFP

"FP" suffix: Used when ordering certain communications controllers for systems in the second version of FCC-compliant cabinets. These were available after January 1, 1985 and before April 22, 1986.) This is not for use on 2250, 2550 or 2655 cabinets, which DO support modular panels. More information on cabling is provided later in this section.

4) XXXXL

"L" suffix: Used when ordering communications controllers for 2550 and 2655 systems.

5) XXXX-2250

"-2250" suffix: Used when ordering communications controllers for 2250 systems.

6) XXXXT

"T" suffix: Used when ordering communications controllers for the 2350 or 2450.

7) XXXXS

"S" suffix: Used when ordering ICS2s and ICS3s for 9X5X systems in FCC- compliant cabinets shipped AFTER April 28, 1986 in Model 7564S peripheral cabinets.

Valid second suffixes are:

1) XXXX-A

System is for 50Hz/220V electrical current only. Three communications products require this second suffix: the ICS2 starter kit (5242), ICS3 5725/5735 and the ICS2 capacity expansion kit (CLAC808).

Example: 5154L

16-line AMLC (V.24/RS-232) for use with system in a lowboy, FCC-compliant cabinet, such as the 2655.

Example: 5725L-A

ICS3 for use with a 2655 system with modular bulkheads in a lowboy cabinet. The subsystem uses 50Hz/220V current.

Example: 5735S-A

ICS3 for use with a 9X5X system in a 7564S peripheral cabinet. The subsystem uses 50Hz/220V current.

INTELLIGENT COMMUNICATIONS SUBSYSTEM CONTROLLER/1 (ICS1)

The ICS1 is a single-board controller that supports eight asynchronous lines and one synchronous communications line. It is fully compatible with all other line controllers. PRIMOS supports a maximum of four ICS1 controllers per system.

Like the older AMLC, each of the asynchronous lines on the ICS1 provide V.24/RS232 interfaces used to attach terminals, serial printers and modems to a Prime system. The maximum speed of these lines is 9600 bits per second (bps). Bits per second is used in this document as a synonymn for baud.

The ICS1 synchronous V.24/RS232 line supports the following:

1. PRIMENET full-duplex HDLC connections
2. EMX80 for IBM 2780/3780 protocols
3. EMHASP for IBM HASP protocols

When used with RJE, the ICS1 supports full- and half-duplex data links at speeds up to 4800 bps. When half-duplex (also known as dial-up or switched) RJE is used, the ICS1 requires that the modem provides a minimum Request-to-Send to Clear-to-Send (RTS/CTS) delay of 8.5 milliseconds (ms).

When used with PRIMENET, the ICS1 supports full-duplex connections to packet-switched data networks (PSDNs) and to other PRIMENET systems. ICS1 PRIMENET connections are HDLC-framed only and can operate at data link speeds up to 9600 bps. The ICS1 does not support half-duplex PRIMENET connections.

PRIMOS Rev. 19.1 and later support ICS1 async and RJE communications; PRIMOS Rev. 19.3 and later support full-duplex PRIMENET communications on the ICS1.

SPECIAL 2250 NOTE
The 2250 system requires ICS1 hardware to perform I/O bus parity checking. For reasons of internal system integrity, the ICS1 cannot be removed or substituted for in a 2250 system.

INTELLIGENT COMMUNICATIONS SUBSYSTEM CONTROLLER/2 (ICS2)

The ICS2 is an intelligent communications subsystem. It is a flexible and powerful communications processor for use in all 50 Series systems except the 2350 and 2450. The ICS2 provides asynchronous line support like the AMLC and ICS1, and is a cost-effective replacement for systems with more than 40 asynchronous lines. One ICS2 controller supports up to 64 asynchronous lines (as explained below).

Figure 4-1 illustrates the ICS2 subsystem. An ICS2 subsystem consists of three separate modules -- the controller, card cage and two types of communications line adapter cards (CLACs):

1. ICS2 Controller

   This features an on-board 16-bit microprocessor, 128KB (async-only version) of RAM, PROM-resident diagnostics, and an event-driven operating system. The ICS2 is down-line loadable by PRIMOS at system start-up.

2. ICS2 Card Cage

   The ICS2 (5242) includes the following: a card cage that supplies space for 16 CLACs, one power supply, one buffer card and four CLAC204s. If a customer requires more than eight ICS2 CLACs (sync or async) in an ICS2 card cage, order a capacity expansion kit (CLAC808). The capacity expansion kit includes an additional power supply (110V/60Hz or 220V/50Hz) and a buffer card to support eight more CLACs. The ICS2 card cage is connected to the ICS2 controller by a 50-wire cable 20 feet in length (maximum allowed); the ICS2 card cable must be housed in a Prime peripheral cabinet. (See the discussion on housing the ICS2 later in this section.)

3. ICS2 CLAC204

   CLAC204s provide asynchronous communications interfaces and are installed in the ICS2 card cage. Each CLAC204 supports four async lines, allowing the base ICS2 card cage to support 32 lines. An ICS2 with a CLAC808 expansion kit can support up to 64 lines. If a customer plans to install a CLAC204 in a 9XXX system with modular bulkheads (shipped after May 6, 1985), use the -FP or -S suffix when ordering each CLAC. CLAC204s installed on 2550s and 2655s should bear a -L suffix.

4. CLAC502s and CLAS522s

CLAC502s and CLAC522s are installed in the ICS2 card cage to provide synchronous support for PRIME/SNA, full-duplex PRIMENET and BSC RJE. Each CLAC502 supports two V.24/RS232 sync lines, at speeds from 1,200 to 19,200 bps. Each CLAC522 supports two V.35/DDS lines at speeds up to 64,000 bps. Both async and sync CLACs can share the same ICS2 card cage and operate simultaneously. If a customer plans to install a CLAC502 or CLAC522 in a 9X5X system with modular bulkheads, (shipped after May 6, 1985), use the -FP suffix when ordering each CLAC. CLAC5X2s installed on 2550s and 2655s should bear a -L suffix. CLAC502s and CLAC522s should be used with the ICS3 Model 5725. This model has an ICS2-style card cage.

The maximum configuration on a Prime system is four ICS2s (with four CLAC808 expansion kits). With 64 CLAC204s, (16 per ICS2) this configuration will support a total of 256 asynchronous lines.

Like the ICS1 and AMLC, the ICS2 offers full-duplex asynchronous communications lines with programmable characteristics. These features simplify the task of configuring sites with a variety of RS232 equipment. The user can select one of 16 asynchronous baud rates from 50 bps to 19,200 bps. These asynchronous lines can be used to connect terminals, printers and modems (such as Bell 212A, 113 and 103 data sets, or their equivalents).

NOTE: Bulkhead space limits the number of asynchronous lines that a 9XXX Series CPU (such as the 9655, 9750 and 9955) can house in its system cabinet. If the system cabinet contains no more than two disk controllers, the customer can use AMLC or ICS1 controllers to house 64 asynchronous lines. If the system cabinet contains three or more disk controllers, only 32 asynchronous lines can be housed in the system cabinet. If the customer requires more asynchronous lines, an ICS2 or an ICS3 and a peripheral cabinet are required. For more details, see the discussion of housing for the AMLC and ICS2 later in this section.

Also note that 2550 and 2655 customers requiring more than 32 lines must use an ICS2.

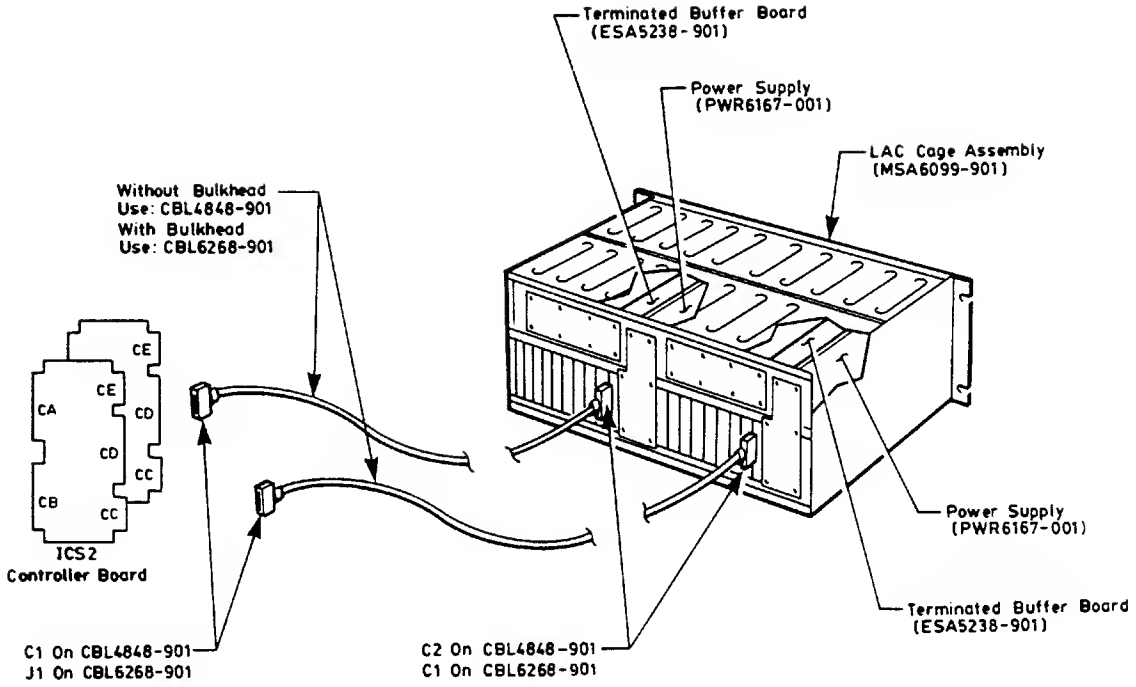


Figure 4-1a. ICS2 Subsystem

INTELLIGENT COMMUNICATIONS SUBSYSTEM/3 (ICS3)

The new ICS3 communications controller allows customers to address nearly all their asynchronous and synchronous communications needs with a single controller and board slot. This controller covers a wide range of system requirements and is available on all new systems and most earlier CPU types. The ICS3 is not available on the Prime 150, 300, 400 or 500 systems. All models require PRIMOS Rev. 20.1.

All models of the ICS3 use the same main controller board with a 16-bit microprocessor and 512K bytes of down-line loadable RAM. The various models of the ICS3 are distinguished by the types of communications card cages attached to the main controller board. All ICS3 models have similar operational characteristics, regardless of the card cages they employ. At this date, there are three card cages for the ICS3:

- 5725: a 16-slot card cage (the same one found in the ICS2) that mounts in all systems served by the ICS2. The card cage and Communications Line Adapter Cards (CLACs) are mounted inside peripheral cabinets. A CLAC808 expansion kit is required when more than eight ICS2-type CLACs are added to a subsystem.

- 5730: an 8-slot card cage that draws current from the CPU power supply and has a new style of ICS3 CLACs that mount directly on the 2350 or 2450 system bulkhead. (See PPA 364 for more details.)

- 5735: a new 16-slot card cage for 9X5X series computer room systems; uses a single power supply and mounts directly on the bulkhead of the 7564S peripheral cabinet. The 5735 uses the same ICS3 CLACs found on 5730.

Main Controller Board

The main controller board of the ICS3 resides in the system backplane and processes synchronous and asynchronous protocols.

With 512K bytes of memory, the ICS3 can support the following protocols concurrently:

- PRIME/SNA SDLC

- Full-duplex PRIMENET (HDLC and bisync-framed X.25)

- IBM Binary Synchronous Communications (BSC) RJE (2780, 3780, and HASP)

- ICS Reverse Flow Control asynchronous communications

Main Controller Board (continued)

The ICS3 supports all the enhancements to the ICS2 announced at PRIMOS Rev. 20.1 (see PPA 364). Please note that the ICS3 does not support the following MDLC protocols:

- Half-duplex PRIMENET
- BSC 3270/DPTX (IBM)
- GRTS (Honeywell)
- 200UT (Control Data)
- Univac 1004 (Sperry)
- 7020 and XBM (ICL)

No commitments should be made that state or imply ICS3 support of half-duplex PRIMENET. Also note that there are no current plans for the ICS3 to support the BSC 3270/DPTX, GRTS, 200UT, 1004, 7020 or XBM protocols.

Card Cages and CLACs

ICS3 Model 5725: Because the ICS3 Model 5725 uses the ICS2 card cage and CLACs, it provides backward compatibility to customers who do not own the new 7564S peripheral cabinet. Despite the differences in card cages and CLACs, there are no functional differences between the various members of the ICS3 product line except card cage capacity and power supplies. All async and sync protocols operate the same on all models. Table 4-2 shows suffixes that are valid for the 5725.

NOTES:

1. All of the hardware configuration rules that exist for the ICS2 Model 5242 also exist for the ICS3 Model 5725 with regard to the number of CLACs and 50/60Hz power supplies (-A suffix).

2. The ICS3 Model 5725 includes a main controller board, card cage, first CLAC808 power supply/buffer card kit, and internal cables. At least one CLAC204/502/522 must be installed to make this ICS3 subsystem operational.

3. Use only CLAC204s, 502s, 522s and 808s with the ICS3 Model 5725. ICS3 CLACs are not compatible with the Model 5725.

4. Existing ICS2 subsystems (Models 5242, 5720 and 5722) can be upgraded to an ICS3 Model 5725.

5. The ICS3 5725 uses the same external cables as those created for the ICS2. Figure 4-1b illustrates the ICS3 Model 5725 card cage and CLACs.

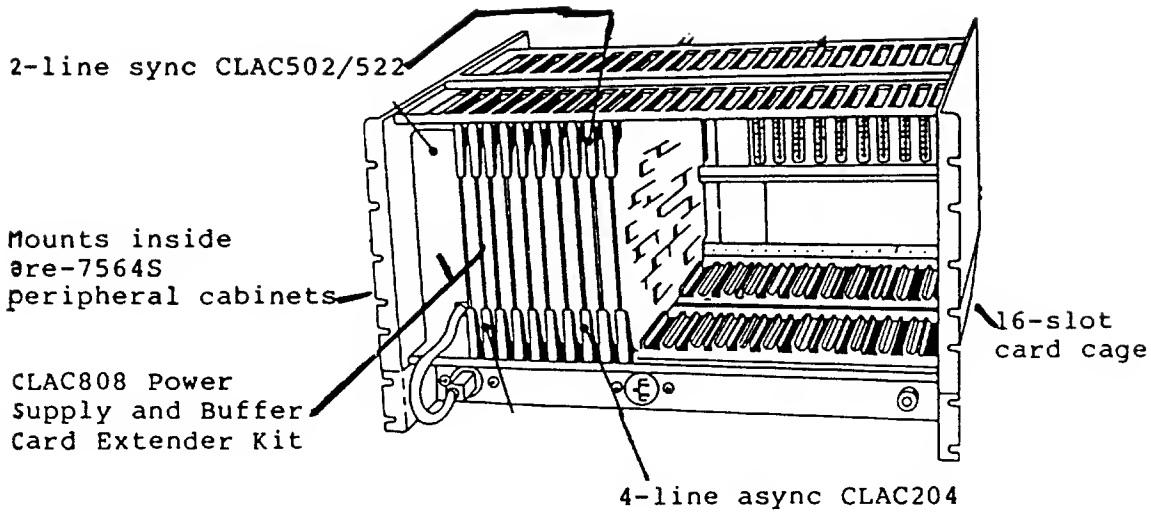


Figure 4-1b. ICS3 Model 5725 Card Cage and CLACs

Card Cages and CLACs (continued)

ICS3 Model 5730: The ICS3 5730 is designed for the 2350 and 2450 systems. New CLACs and an 8-slot card cage require less space than their ICS2 predecessor, and mount directly on the bulkhead of these low-end systems. The 5730 draws current from the CPU power supply and requires no separate peripheral cabinet or internal bulkhead cables.

Because the ICS3 Model 5730 does not contain CLACs, customers must order the necessary type and number of ICS3 CLACs they need to make this subsystem operational.

The functionality of the three ICS3 CLACs is summarized as follows:

- CLAC304: Supports 4 asynchronous V.24/RS-232C lines at speeds ranging from 50 to 19,200 bps.
- CLAC602: Supports 2 synchronous V.24/RS-232C lines at speeds ranging from 50 to 19,200 bps.
- CLAC622: Supports 2 synchronous V.35/DDS lines at speeds up to 64,000 bps.

NOTES:

1. ICS2 CLACs are not compatible with the new ICS3 card cage. Order ICS3 CLACs with the 5730 and 5735 ICS3 subsystems. Likewise, the new ICS3 CLACs are not compatible with the older ICS2 card cage.
2. The ICS3 5730 uses the same external cables as those on the ICS2.

Figure 4-1c illustrates the ICS3 Model 5730 card cage and CLACs.

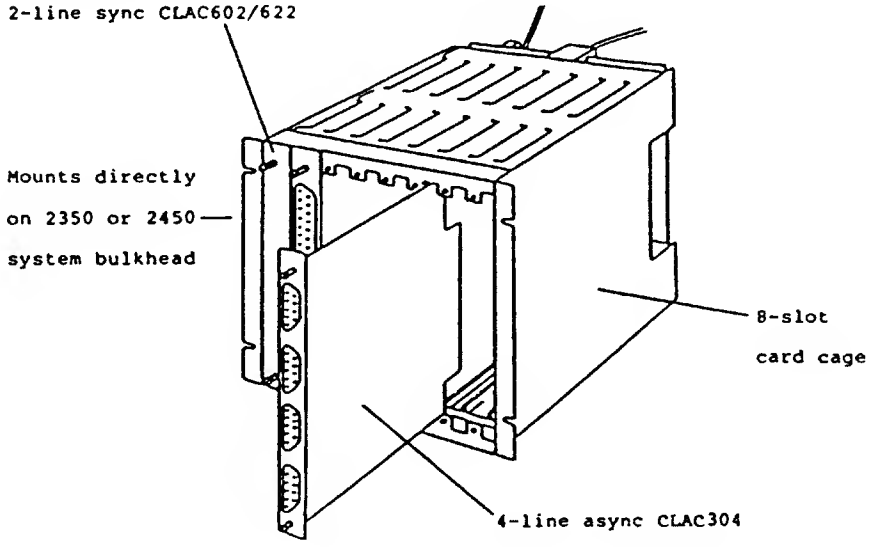


Figure 4-1c. ICS3 Model 5730 Card Cage and CLACs

Card Cages and CLACs (continued)

ICS3 Model 5735: The ICS3 Model 5735, a space-reduced version of the Model 5725, is designed for bulkhead mounting in the 7564S peripheral cabinet found on 9X5X computer room systems. The Model 5735 has a 16-slot card cage and an integral power supply that operates at 120V/60Hz or 240V/50Hz (use -A suffix). No additional extender CLACs are needed to bring the 5735 up to its full complement of 16 CLACs.

Because the ICS3 Model 5735 does not contain CLACs, customers must order the necessary type and number of ICS3 CLACs they need to make this ICS3 subsystem operational.

NOTES:

1. ICS2 CLACs are not compatible with the new ICS3 card cage. Order ICS3 CLACs with the 5730 and 5735 ICS3 subsystems. Likewise, the new ICS3 CLACs are not compatible with the older ICS2 card cage. Use ICS3 CLAC304s, 602s and 622s with the ICS3 5735.

2. The ICS3 5735 uses the same external cables as the ICS2.

3. A maximum of two 5735S subsystems can mount in a 7564S peripheral cabinet. The only two versions of the 5735 are the 5735S and 5735S-A.

4. The ICS3 Model 5735 requires PRIMOS Rev. 20.1.

Figure 4-1d illustrates the ICS3 Model 5735 card cage and CLACs.

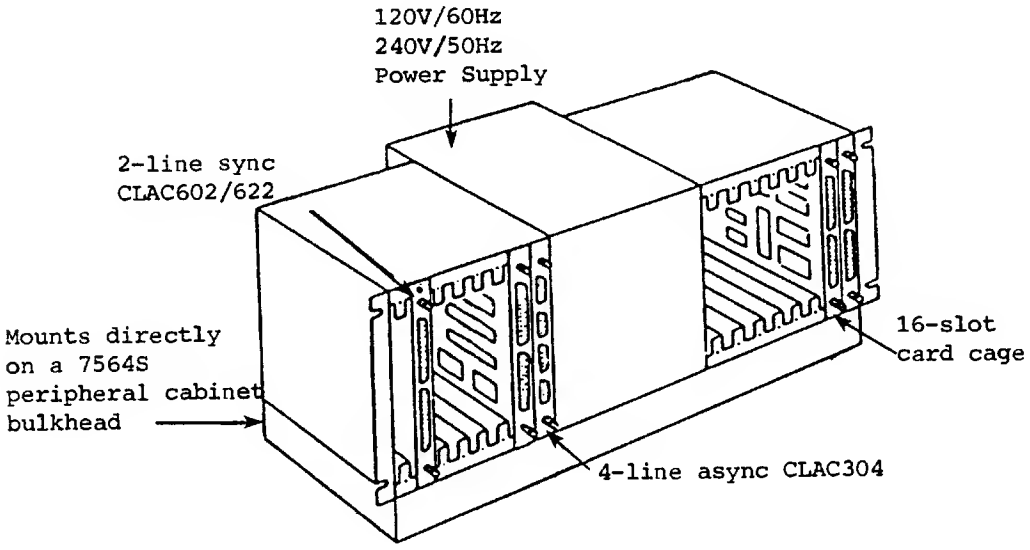


Figure 4-1d. ICS3 Model 5735 Card Cage and CLACs

PRIMENET NODE CONTROLLER II FOR RINGNET

The PRIMENET Node Controller allows customers to connect Prime systems in a RINGNET local area network (LAN) that uses a token-passing control method. Data travels around the RINGNET at 10m bits/second. After allowing for the encoding scheme, RINGNET provides an effective network speed of 8mbits/sec. In actual use, data transfers over the network will be at a slower rate, with the rate determined by CPU sizes, system loads and the number of nodes on a network.

The PRIMENET RINGNET is a network, not a CPU-to-CPU bus. It is also a peer-to-peer network, and as such, does not require a master node. The PRIMENET Node Controller (PNC) contains switching circuits that allow a faulty PNC to be automatically or manually disconnected from the RINGNET network. This fail-soft feature requires that active PRIMENET nodes be separated by no more than 750 feet of twin-axial cable. Figure 4-2 provides an example with three systems. Assuming node B fails, if the distance between nodes A and C (d1 + d2) does not exceed 750 feet, the network will remain operable. If a customer needs to cover a distance greater than 750 feet between system nodes, the Custom Systems Group offers a RINGNET Repeater. A RINGNET Repeater can be inserted between nodes to extend distances beyond 230 meters (750 feet). For more information on the PNCI1, see PPA 347.

Each system connected to the RINGNET Repeater requires a PNC, PRIMENET license and RINGNET cables. The fiber-optic version of the RINGNET Repeater permits customers to create fiber-optic cable segments of RINGNET and also to interface electrical twin-axial cables with optical fibers. Fiber-optic segments of RINGNET require two RINGNET Repeaters and can be up to one kilometer (3280 feet). For more configuration availability and pricing information, please refer to PB-1536 or contact the Custom Systems Group directly.

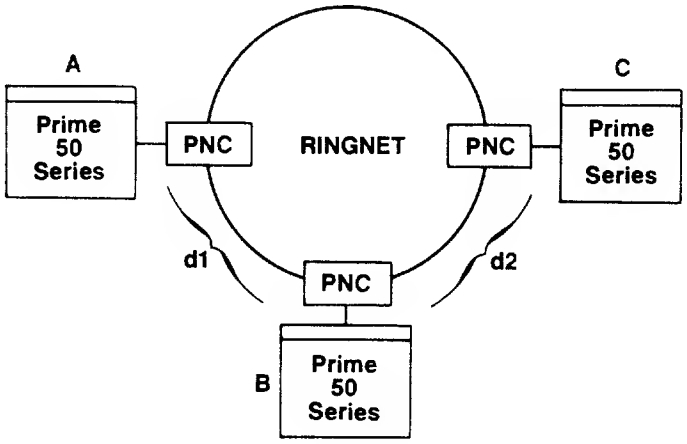


Figure 4-2. PNC Recovery Limits

ASYNCHRONOUS MULTI-LINE CONTROLLER

The AMLC provides connections for 16 asynchronous communication lines. It uses the Direct Memory Queue (DMQ) mode of operation that relies on central processor microcode for fast, efficient buffering of all output data.

The AMLC provides full-duplex communications support and a number of programmable line characteristics. These simplify configuring sites with mixed equipment. Customers can set each AMLC line to one of eight software-configurable clock speeds, ranging from 50 to 19,200 bps. AMLC lines connect CCITT V.24/RS232C or 20ma current-loop compatible terminals and peripheral devices, as well as Bell 103, 113 and 212 data sets.

MULTI-LINE DATA LINK CONTROLLER

The MDLC allows Prime 50 Series systems to support multiple synchronous communications lines simultaneously. With Direct Memory Access (DMA), full on-board character buffering and a micro-programmed architecture, the MDLC supports high-speed operations. The MDLC architecture allows on-board microcode to be used for the majority of protocol support operations. This frees up the central processor for other operations, and also provides efficient support for a wide-range of synchronous protocols. Some of these include the communications software RJE emulators (see Communications Software section) and High-Level Data Link Control (HDLC) protocol for connection to CCITT X.25-compliant packet-switching networks using PRIMENET.

The MDLC supports full-duplex synchronous point-to-point PRIMENET connections to Prime 50 Series systems using the HDLC link-level protocol. Half-duplex synchronous point-to-point PRIMENET connections to Prime 50 Series systems use the bisync link-level protocol.

Basic MDLCs provide two lines, but the number of lines can be doubled with an expansion option (see Table 4-2). An MDLC firmware option package for protocols must be ordered for each MDLC. When ordering more than one MDLC, indicate that the firmware package goes with each MDLC. If the MDLC order is for an existing system which already has one MDLC, indicate this on the order so that the factory will assign the correct device address to the expansion MDLC. The MDLC, ICS1 and ICS2 synchronous lines support the Bell 201, 203, 208, 209 and 2096 data sets.

CONFIGURATION INFORMATION

The following configurartion information is divided into three parts:

- General Information
- Configuring Synchronous Lines
- Configuration Tables

General Information

These general guidelines help ensure proper configuration of the communications hardware subsystems. Consult the previous Features and Functions section for details.

1. Cabling

All cabling from the system or peripheral cabinet bulkhead to customers' equipment must be ordered as a separate line item. Each subsystem comes with all internal cabling and mounting hardware.

2. Configuration Limits

Keep these three configuration questions in mind:

a. How many communications subsystems of each type can a 50 Series system support?

b. What is the maximum number of each type of communication line?

c. What is the maximum number of communications lines each software product can support?

3. Subsystem Housing

Often a CPU system cabinet will house a subsystem, but some subsystems (such as the ICS2) may require space in a peripheral cabinet.

Configuring Synchronous Lines

PRIMOS currently supports a maximum of two controllers providing synchronous line support. These controllers can be either MDLC controllers providing up to four lines each; two ICS1 subsystems providing one line each; two ICS3 subsystems supporting multiple synchronous lines; or a combination of two out of these three controllers. These physical line limitations are based on the available CPU power to drive each line supplied by each 50 Series system.

While each Prime system can support a certain number of physical synchronous communications lines, there are also limits on how many lines each communications product (such as PRIMENET) can support. The number of lines supported by each communications product is a subset of the number of physical lines supported by each system type.

EXAMPLE: A 550-II can be configured with up to four synchronous lines, but PRIMENET supports a maximum of three. The fourth line could be used with RJE or DPTX.

Configuration Tables

There are three limitations which you must not exceed when configuring a system with communications subsystems. Tables 4-3 and 4-4 firmly represent those limits. Note that the subsystem key of Table 4-4 references the key in Table 4-2. Remember also that the number of lines physically configured on a system can differ from the number of lines a communications software product supports. The number of lines supported by each communications software product is discussed in the communications software section.

NOTE FOR 2350 AND 2450:

Four is the maximum number of synchronous lines on a 2350 or 2450. In situations where an ICS1 and two 2-line MDLCs are installed, the synchronous line on the ICS1 must be disabled. In situations where two ICS1s and an MDLC are installed, one of the synchronous lines on the ICS1s must be disabled.

TABLE 4-3. COMMUNICATIONS HARDWARE SUBSYSTEMS 50 SERIES CONFIGURATION LIMITS

Subsystem	Maximum Per System	Required Board Slots
ICS1	4	1
ICS2	4	1
ICS3	4	1
PNC2	1	1
AMLC	8	1
MDLC	2	1

Maximum Controller Combinations

Combination *	Maximum Number
Mixed synchronous controllers (MDLC, ICS1 and ICS3)	2**
Mixed asynchronous controllers (AMLC, ICS1, ICS2 and ICS3)	***
Mixed ICS controllers (ICS1, ICS2 and ICS3)	4

* Mixed synchronous controllers refers to any controller that supports synchronous communications and is configured to operate synchronously on a 50 Series system. Both the ICS1 and ICS3 may support synchronous communications; however, the ICS controllers may be used for asynchronous communications only.

** More than two synchronous capable controllers can be present in the same system. Only two of these controllers can be configured for synchronous use.

*** The limit is dependent upon the maximum number of asynchronous lines supported by PRIMOS.

TABLE 4-4. COMMUNICATIONS HARDWARE SUBSYSTEMS
50 SERIES COMMUNICATION LINE LIMITS

System	Subsystem Key	Maximum Async Lines	Maximum * Sync Lines	Maximum RINGNETs
9955 II	a,b,c,d,e,f1,f3	256**	8	1
9955	a,b,c,d,e,f1,f3	256**	8	1
9950	a,b,c,d,e,f1,f3	256**	8	1
9755	a,b,c,d,e,f1,f3	192	8	1
9750	a,b,c,d,e,f1,f3	192	8	1
9655	a,b,c,d,e,f1,f3	128	8	1
9650	a,b,c,d,e,f1,f3	128	8	1
850	a,b,c,d,e,f1,f3	128	8	1
750	a,b,c,d,e,f1,f3	96	8	1
650	a,b,c,d,e,f1,f3	64	4	1
550II	a,b,c,d,e,f1,f3	64	4	1
550	a,b,c,d,e,f1.f3	64	4	1
500	c,d,e	64	4	1
450II	a,b,c,d,e,f1,f3	64	4	1
450	a,b,c,d,e,f1,f3	64	4	1
400	c,d,e	64	4	1
2655	a,b,c,d,e	64	4	1
2550	a,b,c,d,e	64	4	1
2450	a, c,d,e,f2	40	4	1
2350	a, c,d,e,f2	32	4	1
300	c,d,e	32	2	1
250II	a,b,c,d,e,f1,f3	32	2	1
2250	a,b,c,d,e	32	2	1
250	a,b,c,d,e,f1,f3	32	2	1
150	c,d,e	32	2	1

* Refer to individual software products in the Communications Software Section for the maximum number of lines that each product supports.

** Although these CPUs support 256 lines, PRIMOS has an absolute limit of 254 simultaneous users.

HOUSING INFORMATION

When ordering communications subsystems components, be aware that different types of cabinets determine the suffixes appended to standard model numbers. These suffixes indicate the proper internal cables and packaging needed to fill the order. The type of cabinet also determines the type of cables that are required.

Intelligent Communications Subsystem/1 (ICS1)

The ICS1 controller is always housed in either the CPU or in the 9750/9755/9950/9955 II I/O cabinet and takes one board slot. Four is the maximum number of ICS1s that can be configured on a Prime 50 Series system. Note that the ICS1 is packaged with all 2250s and some 2350s.

Intelligent Communications Subsystem/2 (ICS2)

The ICS2 card cage can only be housed in the high-boy (53-inch) and low-boy (30-inch) peripheral cabinets. An ICS2 card cage cannot be housed in a system cabinet, or in 2350/2450 systems. The components of the ICS2 (controller, card cage and communications line adapter cards) are shown in Figure 4-1.

Figure 4-3 illustrates how the ICS2 mounts in FCC-compliant cabinets. Configurations of high-boy peripheral cabinets are documented in Section 5. Figure 4-4 illustrates the possible configurations with a low-boy peripheral cabinet.

NOTE: If a 2550 or 2655 system requires more than eight CLACs, the ICS2 expansion kit (CLAC808) will include a modular bulkhead panel supporting eight additional CLACs.

Intelligent Communications Subsystem/3 (ICS3)

The three models of the ICS3 can be housed in a number of ways:

1. The ICS3 Model 5725 is always mounted in a peripheral cabinet. This model follows the same configuration rules as the ICS2, but is not suited for the 7564S 9X50 peripheral cabinet.

2. The ICS3 Model 5730 mounts in the system cabinet of a 2350 or 2450.

3. The ICS3 Model 5735 mounts on the bulkhead of the 7564S peripheral cabinet. Only two 5735s can be mounted in a single 7564S cabinet.

For more information on the ICS3, refer to PPA 364.

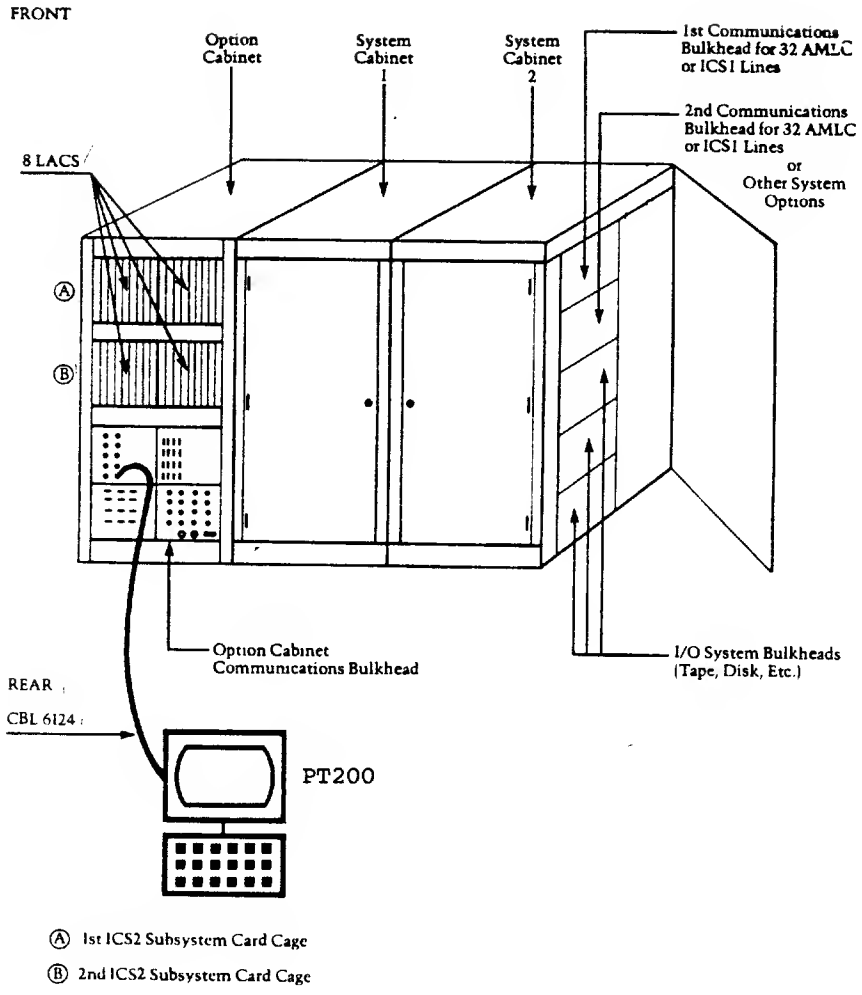


Figure 4-3. ICS2 with FCC-Compliant Cabinet

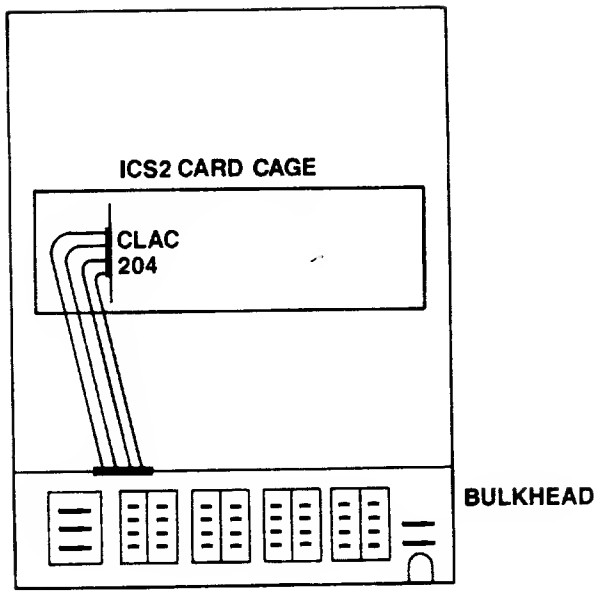


Figure 4-4. ICS2 with Low-Boy Peripheral Cabinet

Asynchronous Controllers - AMLC, ICS1, ICS2 and ICS3

AMLC controllers are always housed in the system CPU or I/O (975X or 995X) cabinet. Older, non-FCC cabinets can hold up to eight AMLC controllers (104 lines). The newer, FCC-compliant system cabinets support a maximum of 64 asynchronous lines (four AMLCs or two AMLCs and four ICS1s).

When a system configuration requires more than 64 asynchronous lines, the customer must use the ICS2 subsystem mounted in a peripheral cabinet. Also, if a system configuration has three or more disk controllers, space limitations on the system bulkhead restrict the number of AMLC or ICS1 lines to 32. The customer must use the ICS2 or ICS3 for asynchronous lines beyond these numbers.

Use the 1469/1470 series cables with non-FCC cabinets. These cables extend from the rear of the cabinet. Use the 6124/6109 series of cables with FCC-compliant cabinets.

Multi-line Data Link Controllers

MDLC controllers are similar to the AMLC, in that they are always housed in the system CPU or I/O cabinet. Up to two MDLC controllers can be configured on a system, and each MDLC can supply up to four lines, except the 2350 and 2450, which utilize the two-line version of the MDLC. These eight lines can be used on the 9655 and larger systems.

Use the 1471/1472 Series cables with non-FCC cabinets. These cables extend from the rear of the cabinet. In FCC-compliant cabinets, MDLC lines terminate at the system bulkhead located behind the system cabinet side door. Use the 6127/8780 series cables with FCC-compliant cabinets to connect synchronous modems and data adapter units to the system bulkhead.

PRIMENET Node Controller (PNC)

The PNC subystem is always housed in the system or I/O cabinet. A system can contain only one PNC subsystem.

Depending on the type of cabinet, different suffixes are appended to the standard PNC model number to indicate the type of internal cables and packaging needed. The type of cabinet has no effect on the Prime-supplied RINGNET twin-axial cable used in the RINGNET local area network. See the section on Communications Cables for details on RINGNET cables.

CABLE CONFIGURATION REQUIREMENTS

Normally, when 50 Series peripheral devices are ordered, the external cabling required for the devices are automatically included. The AMLC, ICS1, ICS2, MDLC and PNC devices are exceptions to this.

Whenever you order these controllers for a system, the order will include all the required internal cabling. The suffix for controllers ensures that a system receives all the internal cabling and mounting hardware appropriate for that system. For example, all devices with the "-F", "-FP", "-L", "-T" or "-2250" suffix include cabling to the system's I/O bulkhead; devices without a suffix do not include any cables. In every case, order external cabling separately, according to the device suffix on the communications controller or ICS2 CLAC.

CABLING ASYNCHRONOUS DEVICES

Table 4-5 summarizes the cable requirements for systems in FCC-compliant cabinets with I/O bulkheads. Table 4-6 shows the cable requirements for systems in non-FCC compliant cabinets.

TABLE 4-5. CABLING ASYNCHRONOUS DEVICES ON FCC-COMPLIANT SYSTEMS

Devices	5154:-2250;-L; -F;-FP;-T 5181:-2250;-L; -F;-FP;-T All ICS2s and ICS3s	5174: with no suffix; -FP; -F; -L; -2250	5175: with no suffix; -FP; -F; -L; -2250
RS232-C/CCITT V.24 Direct-Connect Devices	CBL6124 or CBL6109 and CBL6596	Not Applicable	CBL6124 or CBL6109 and CBL6596
Data Set (Modem) Types: Bell 103J, 103A3, 103F or 113 (or equivalent)	CBL6109	Not Applicable	CBL6109
Data Set (Modem) Types: Bell 212A, Racal-Vadic VA3400 (or equivalent)	CBL6109	Not Applicable	CBL6109
20 ma Current-Loop Direct-Connect Devices	Not Applicable	CBL7515	CBL7515

NOTES:

- All ICS2 and ICS3 models use an I/O bulkhead, even if the system is in a non-FCC compliant cabinet.

CABLING ASYNCHRONOUS DEVICES (continued)

- To assist in system upgrades, customers can connect their old-style cables (see Table 4-6) to controllers in FCC-compliant cabinets by using an adapter cable, Product Number CBL7508-001.
- When upgrading CPUs and retaining communications controllers for use in the upgraded cabinet, additional internal cables and/or modular bulkhead panels may be required. These must be ordered separately.

TABLE 4-6. CABLING ASYNCHRONOUS DEVICES ON NON-FCC CABINET SYSTEMS

Devices	5154 5181	5174	5175
RS232-C/CCITT V.24 Direct-Connect Devices	CBL1470 or CBL1469 and CBL6596	Not Applicable	CBL1470 or CBL1469 and CBL6596
Data Set (Modem) Types: Bell 103J, 103A3, 103F, or 113 (or equivalent)	CBL1469	Not Applicable	CBL1469
Data Set (Modem) Types: Bell 212A, Racal-Vadic VA3400 (or equivalent)	CBL1469	Not Applicable	CBL1469
20ma Current-Loop Direct-Connect Devices	Not Applicable	CBL1457	CBL1457

BAUDRATE VERSUS CABLE LENGTHS FOR PRIME RS232-C

Prime uses, as does most of the industry, RS232 line drivers and receivers at lengths longer than the recommended standard of 50 feet or 15 meters. The most reliable method to drive distances greater than 50 feet is to use circuits designed for this environment, such as those suggested by the EIA-RS442/443 standard. These devices can drive up to 4000 feet at high data rates; unfortunately, there is very little equipment available from manufacturers (including Prime) to support this standard.

When using RS232-C line drivers and receivers at lengths longer than 50 feet, follow these guidelines:

1. Use CBL6124 on FCC-compliant systems; CBL1470 on non-FCC 50 Series systems
2. Use 22-gauge shielded, twisted pair cable
3. Use PT25, PT45, PT65, PST100, PT200 terminals or the Prime Producer 100, PERFORMER PC Option or PERFORMER Workstation
4. Observe the maximum cable lengths by baudrate shown in Table 4-7.

TABLE 4-7. BPS AND MAXIMUM CABLE LENGTHS FOR RS232

Prime Customer Service Maximum Cable Length for Supported Service (see Note 1) (See Note 1)	Maximum Cable Length (Assumes optimum cable routing, no interference, etc.) (See Note 2)
19,200 bps 50 feet	200 feet
9,600 bps 500 feet	1,000 feet
4,800 bps 1,000 feet	2,000 feet
2,400 bps 1,500 feet	3,000 feet
1,200 bps 2,000 feet	4,000 feet

Note 1. These distances take into account circuit degrading over potentially poor cable routing and other factors.

Note 2. These maximum distances can easily be exceeded with twisted pair cabling, grounded shielding and other methods. These figures are provided solely as recommended maximum.

BAUDRATE VERSUS CABLE LENGTHS FOR PRIME RS232-C (continued)

Table 4-7 indicates that a current Prime terminal (1000 feet from the processor) will be supported by Prime Customer Service at a line speed of 4800 baud; it may very well function acceptably at 9600 bps, but will not be supported at this speed and distance. If the speed is essential, a pair of modem eliminators or line drivers can be installed at customer expense.

If a customer is purchasing cables from a third party, recommend they procure a low impedance type of cable (2-4 Picofarads per foot).

FCC EMISSIONS STANDARDS AND SYSTEM CABLE REQUIREMENTS

The United States Federal Communications Commission (FCC) continues to enforce its restrictions on the levels of "noise" and "interference" that a computing system (and its components) can generate. In order to comply with these restrictions, certain changes have been made to to 50 Series cabinets and the way that cables are connected to the system. The major enhancement is the addition of an I/O bulkhead for both asynchronous and synchronous device cabling, as well as tape drive and disk drive cables.

This bulkhead serves as a common connection point for all cables entering or leaving a system cabinet. For asynchronous and synchronous devices, this is a neater and more convenient cabling interface than the former "spaghetti cables" under a raised floor.

Use Table 4-5 to determine which cable you need for each device and ORDER ONE CABLE PER DEVICE, according to the communications controller type. Column 1 will almost always include the cables you need.

For devices housed in FCC-compliant cabinets, customers can continue using their old-style cables, except when using an ICS2 or ICS3. Table 4-6 includes these cables. NOTE THAT ALL CABLES IN TABLE 4-6 SUPPORT UP TO FOUR DEVICES!

If a customer upgrades from a system in a non-FCC cabinet to an FCC-compliant system, one of the following options may be chosen:

1. If the new system has no ICS2sor ICS3s, existing cables may be used, therefore bypassing the I/O bulkhead entirely. This is a special case provided for by FCC regulations, which exempts a customer's current environment from compliance.

2. If the new system has ICS2sor ICS3s, or the customer wishes to take advantage of the I/O bulkhead to simplify cabling and reduce electrical interferences the following may be done:

   a. Replace all existing cables with selections from Table 4-6; or

   b. Convert existing cables to use 9-pin "D" connectors to interface to the I/O bulkhead; or

   c. Adapt current cables to interface with the I/O bulkhead using the CBL7508-001 cable adapter.

NEW MODULAR BULKHEADS FOR 9XXX-SERIES

At the end of January, 1985, system cabinets began shipping with a modified I/O bulkhead. A new communications controller Product Number suffix, "-FP", must be used when ordering AMLC and ICS1 controllers and ICS2 CLACs for 53-inch 9XXX systems. The "-S" suffix must be used when ordering an ICS2 controller for a peripheral cabinet shipped AFTER April 28, 1986. The "-S" suffix applies only to the main controller. CLACs with an "-FP" suffix are used with "-S" ICS2 controllers.

The modified I/O bulkhead design makes all 53-inch system cabinet I/O bulkheads similar to the 2550/2655 system cabinet I/O bulkhead, in that it accomodates "modular panels" for communications controllers. "Modular panels" are panels connected to the internal cables of a communications controller during the manufacturing process. Figure 4-5 illustrates a "modular panel" for four asynchronous lines.

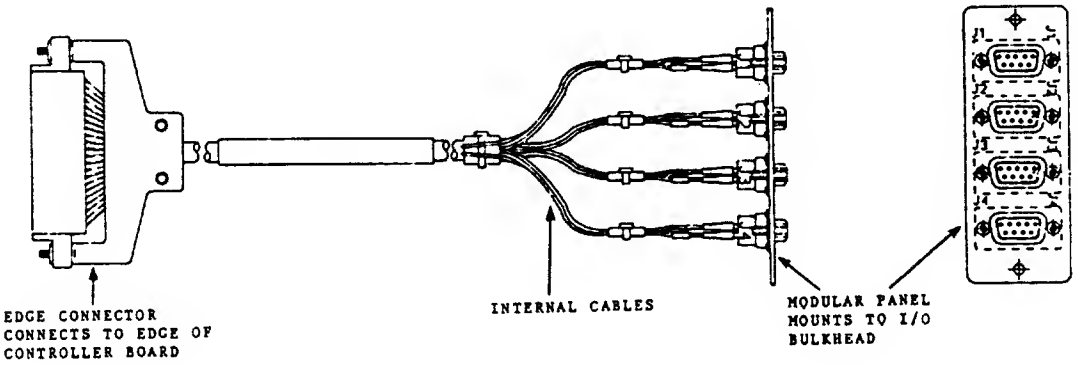


Figure 4-5. Modular Panel with Four Ports for Asynchronous Lines

Prior to this change, FCC-compliant AMLC and ICS1 controllers for 53-inch systems included the controller with attached internal cables, but no modular panels. These internal cables were individually connected to holes in the existing system cabinet I/O bulkhead. The modified I/O bulkhead that supports modular panels on 53-inch system cabinets makes installation of asynchronous and ICS2 synchronous lines inn FCC-compliant cabinets more efficient. The new I/O bulkhead also provides for a more logical and sequential arrangement of communications ports on the I/O bulkhead.

Figure 4-6 (on the following page) shows three types of internal cabling used with the AMLC and ICS1 controllers, based on their suffixes. CLAC204, CLAC502 and CLAC522 for the ICS2 and ICS3 Model 5725 follow the same suffix convention. The ICS3 Models 5730 and 5735 do not have internal cables.

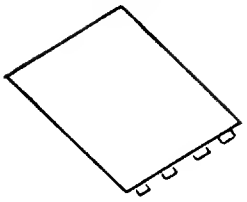
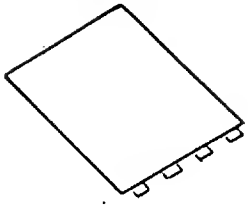
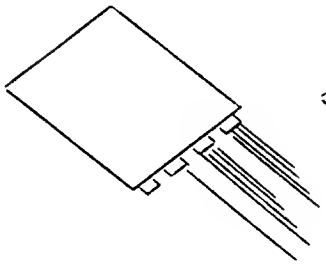
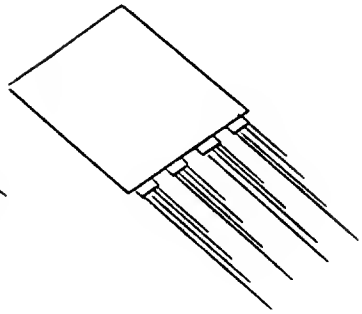
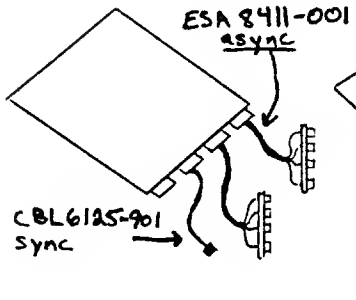
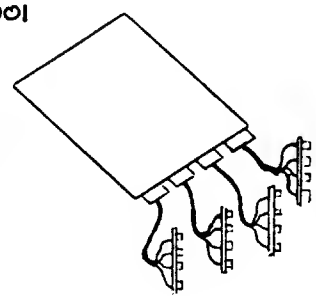
Product Number Suffix	ICS1	AMLC	COMMENTS
No suffix			No internal cables or modular panels. For use on non-FCC compliant systems.
F and -2250			Includes internal cables, but not modular panels. For use on FCC-compliant systems which do not support modular panels.
L and FP			Includes internal cables and, for async lines, modular panels. For use on FCC-compliant systems that support modular panels.

Figure 4-6. AMLC and ICS1 Controller Types

These diagrams indicate that the new suffix for AMLC, ICS1 and ICS2 CLAC Product Numbers is "-FP", where "F" indicates that it is an FCC-compliant, 53-inch system cabinet, and "P" indicates that it is a modular panel style cabinet. When ordering an AMLC or ICS1 for a system in a 53-inch cabinet, you must determine whether the "-F", "-FP" or "-S" suffix is appropriate. "-F" is correct for 53-inch systems manufactured prior to the I/O bulkhead modularization, and "-FP" must be used for 53-inch systems manufactured after the modification. Figure 4-7 illustrates the I/O bulkhead of 53-inch systems before and after the I/O bulkhead modification. Use these illustrations to determine whether the "-F" or "-FP" suffix is appropriate.

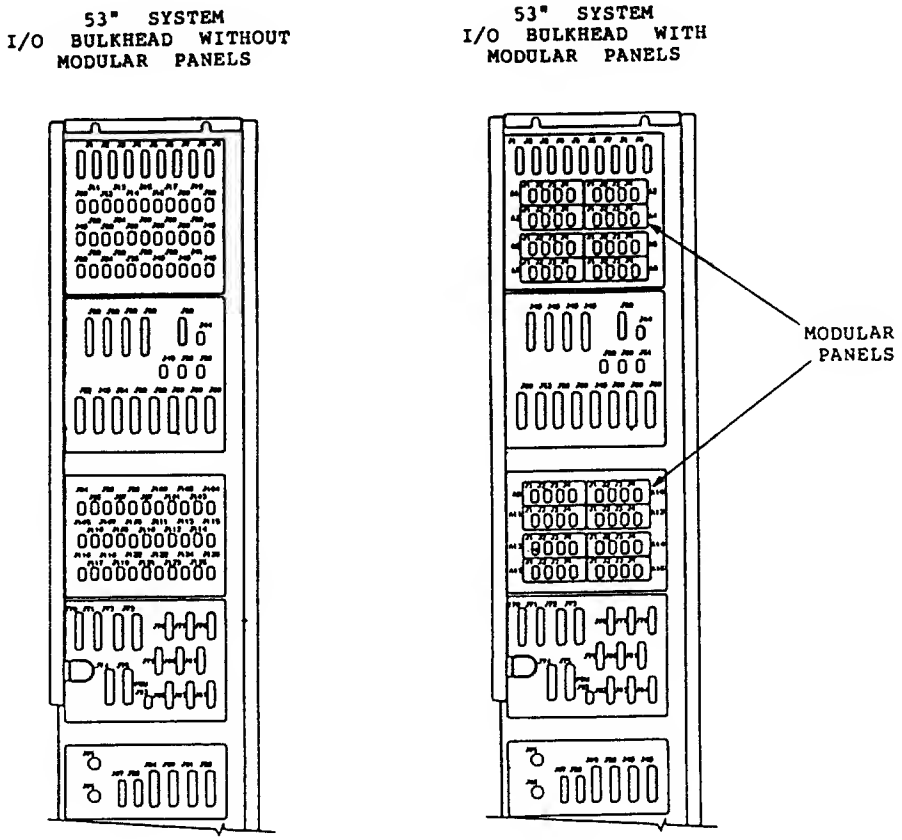


Figure 4-7. I/O Bulkhead Before and After Modification

CABLE DESCRIPTIONS

The following paragraphs describe Prime's standard cable offerings; a specific suffix indicating length is required when ordering. Please consult the Price Book for complete product numbers and prices.

CBL6124 (For use with all FCC-compliant systems and all ICS2/3s)

CBL6124 is generally used for connecting locally-configured devices, such as terminals. These devices are normally in the same building as the Prime host system to which they are connected. Each CBL6124 cable supports a single asynchronous device, and is available in various lenghts up to 100 meters (329 feet). See Figures 4-10, 4-11 and 4-12 for sample diagrams.

CBL6109 (For use with all FCC-compliant systems and all ICS2/3s)

CBL6109 is generally used for connecting to asynchronous modem devices or to a data part on a PBX. This cable supports the same modems identified in CBL1469. CBL6109 is 15 meters (50 feet) long and supports a single device. It can be adapted to allow direct-connect devices to connect to the Prime host system by ordering CBL6596. Refer to Figures 4-10, 4-11 and 4-12 for sample diagrams.

CBL7515 (For use with all FCC-compliant systems)

CBL7515 is used for connecting 20ma terminal devices to AMLC Product Numbers 5174F or 5175F. Each CBL7515 cable supports a single 20ma device, and is 10 meters long.

CBL1470 (For non-FCC systems only)

CBL1470 is normally used for connecting locally-configured devices, such as CRT terminals. Referred to as direct-connected devices, these terminals are usually located in the same building as the 50 Series system to which they are connected. Each CBL1470 cable has four EIA female connectors, allowing up to four direct-connect devices to be accommodated. CBL1470 is 9.2 meters (30 feet) long. Sample diagrams are provided in Figures 4-8 and 4-9.

CBL1469 (For non-FCC systems only)

CBL1469 is usually used for connecting modems to the AMLC or ICS1 on 50 Series systems. The types of modems normally used are Bell 103J, 103A3, 103F, 113 and 212, VADIC 3400 or equivalent, full-duplex modems. Each CBL1469 cable has four EIA male connectors to allow for up to four modems to be configured. CBL1469 is 9.2 meters (30 feet) long. CBL1469 can be adapted to allow direct-connect devices to be connected to the AMLC or ICS1 by ordering CBL6569, which is described later in this section. Refer to Figures 4-8 and 4-9 for sample diagrams.

CBL1457 (For non-FCC systems only)

CBL1457 is used for connecting 20ma terminal devices to AMLC Type Numbers 5174 and/or 5175. Each CBL1457 cable has four 20ma, lug-type connectors to accommodate up to four 20ma terminal devices. CBL1457 is 9.2 meters (30 feet) long.

CBL1258 (For non-FCC systems only)

CBL1258 is normally used to connect full data set control modems to the AMLC. Full data set control means half-duplex communications that are not supported by PRIMOS. Each CBL1258 has four male EIA connectors to allow up to four modems to be interfaced to the AMLC. CBL1258 is 9.2 meters (30 feet) long.

ASYNCHRONOUS CABLE ADAPTERS

CBL6596 (For use will ALL systems)

CBL6596 is an adapter for CBL6109 or CBL1469 (modem cable), enabling local devices to be connected to the Prime host system, as in CBL6124 or CBL1470, respectively. See Figures 4-8, 4-9, 4-10, 4-11 and 4-12 for illustrations. CLB6596 is available in 25 centimeters or three meter lengths.

CBL7508 (For use will all FCC-compliant systems)

CBL7508 adapts existing CLB1469 and CBL1470 cables for use with FCC-compliant systems. This cable has four 9-pin "D" connectors on one end (which connects to the I/O bulkhead), and terminates in a 44-pin edge card that will connect to a CBL1469 or CBL1470. CBL7508-001 is three meters long.

CBL6366

A series of conversion cables are available which will adapt a standard CBL6124 (with 4-40 screws) to a connector with either 4-40 lugs (to connect to an extension cable), or to 3mm screws (to connect to a Terminet). No wiring changes are made with these cables--they are merely to adapt the connectors.

Figures 4-8 and 4-9 show the cables used with AMLCs and ICS1s in non-FCC compliant systems:

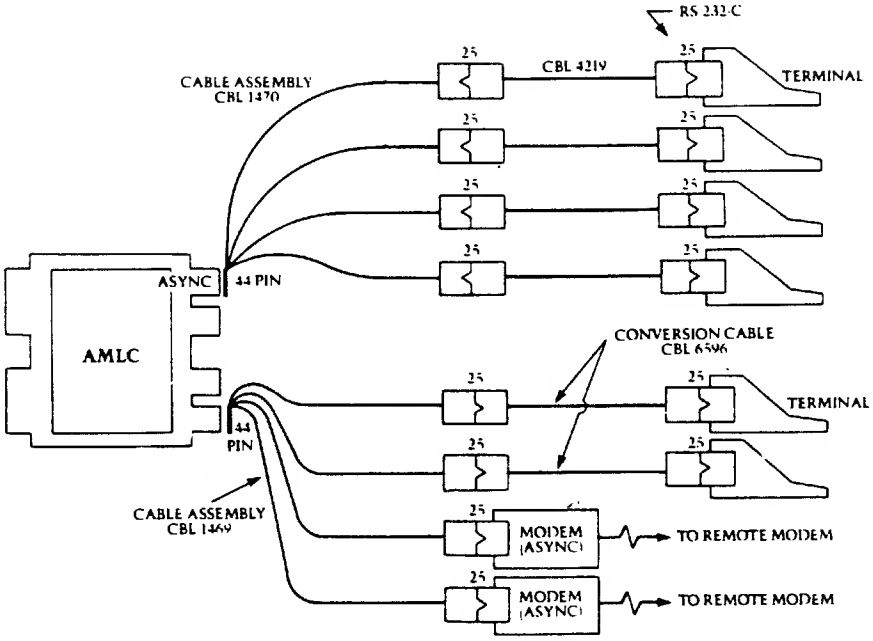


Figure 4-8. AMLC Cabling Diagram for Non-Bulkhead (Non-FCC Compliant Systems)

NOTES:

- CBL4219 is six feet long and bundled with all Prime terminal products.
- Any of the following terminals can be configured on an AMLC:
  - CRT Product Numbers: 3221, 3222, 3223, 3225, PT25, PT45, PT65, PST100, PT200 and the Prime Producer 100
  - Console Product Numbers: 3111 and 3113
  - Serial Printer Product Number: 3126
- Devices with an RS232-C Interface can be configured locally or remotely.
- Devices with 20ma Interfaces are direct-connect devices and can only be configured locally (not illustrated).

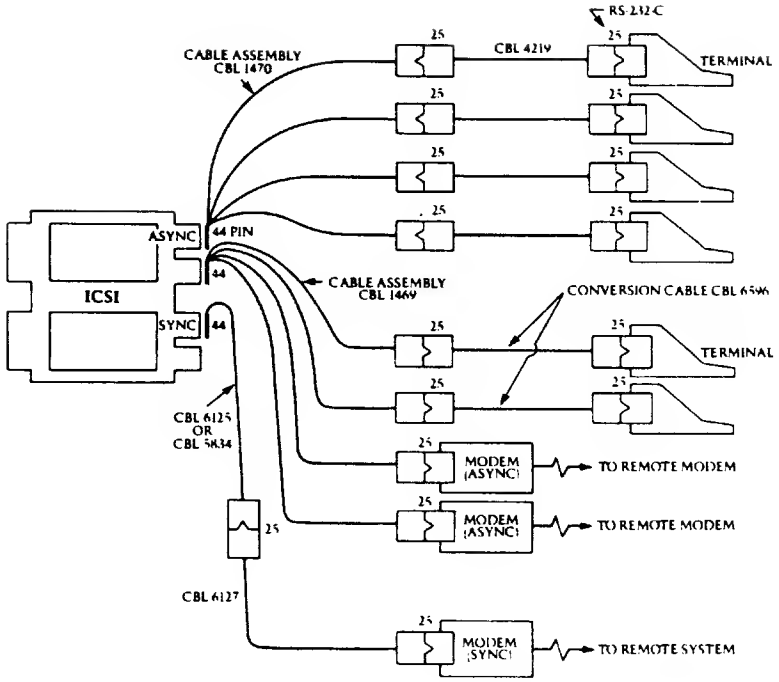


Figure 4-9. ICS1 Cabling for Non-FCC Compliant Systems

NOTES:

- CBL5834 or CBL6125 is 46 cm long and bundled with ICS1 (Product Number 5181).
- CBL4219 is bundled with all Prime terminal products.
- CBL6125 or CBL5834 is bundled with ICS1 (Product Number 5181).

Figures 4-10, 4-11 and 4-12 show the cables used with AMLCs, ICS1s and ICS2s in FCC-compliant systems:

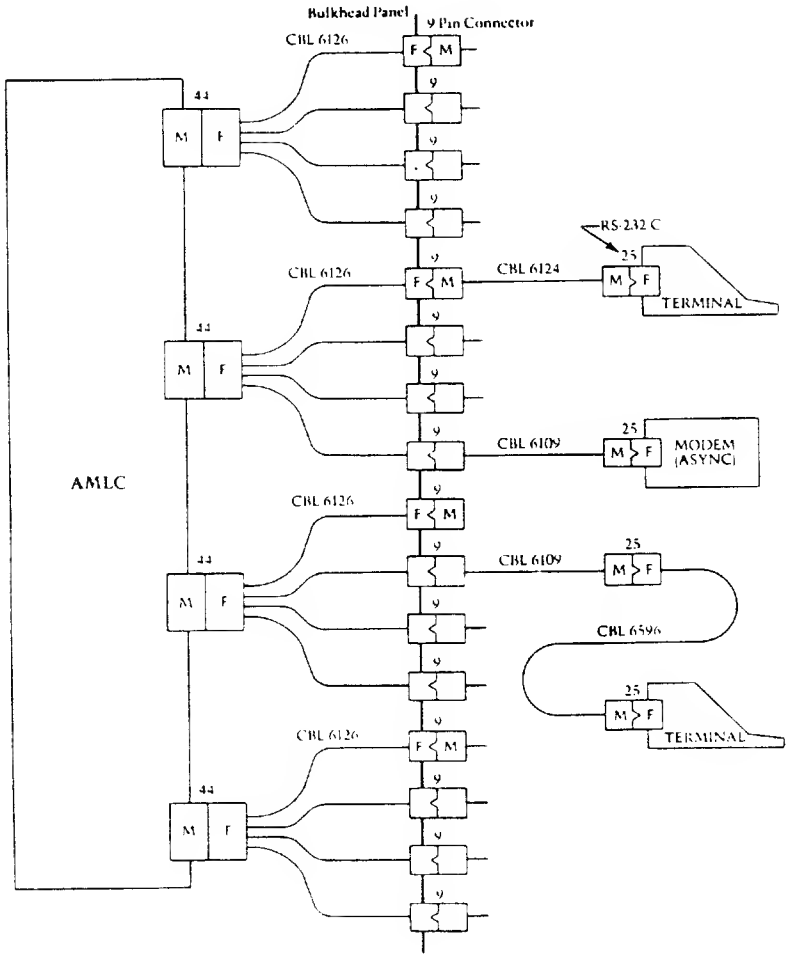


Figure 4-10. AMLC Cabling for FCC-Compliant Systems with Bulkhead or I/O Panel

NOTES:

- CBL6126 is an internal cable, and is bundled for shipment with the system (Product Number 5154-2250, 5154F or 5154L).
- CBL6124 is available in various lengths up to 100 meters (329 feet).

PRIMENET Node Controller (PNC) Cable Requirements

One PNC Product Number (7041, 7041F, 7041T or 7041-2250) and one PNC Cable is required for each Prime System in the network. The aggregate distance between systems cannot exceed 230 meters (750 feet). The PNC Cable lengths and their corresponding type numbers are listed below.

Cable Product Number	Length
CBL3532	3.2 meters (10 feet)
CBL3533	15 meters (50 feet)
CBL3534	65 meters (200 feet)
CBL3535	166 meters (500 feet)

CBL1451 (Non-FCC Compliant Systems)

CBL1451 is used for the Paper Tape Reader (Product Number 3121) or the Paper Tape Reader of a Paper Tape Reader/Punch device (Product Number 3122 or 3123). In both cases, the SOC 3006 Controller is used. CBL1451 is 6.2 meters (10 feet) in length.

CBL1432 (Non-FCC Compliant Systems)

CBL1432 is used for the Paper Tape Punch of a Paper Tape Reader/Punch device (Product Number 3122 or 3123), with the SOC 3066 Controller. CBL1432 is 6.2 meters (10 feet) in length.

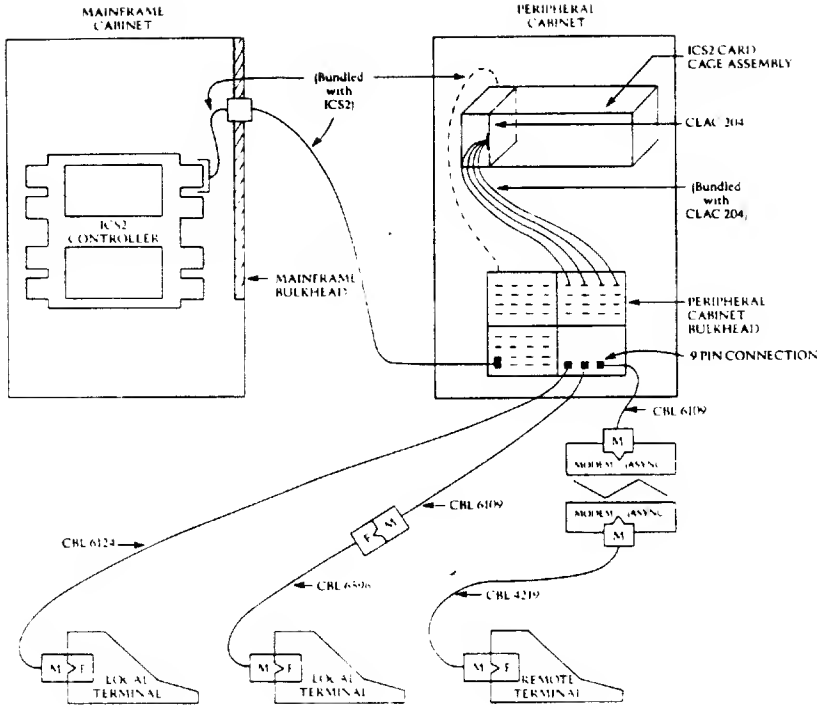
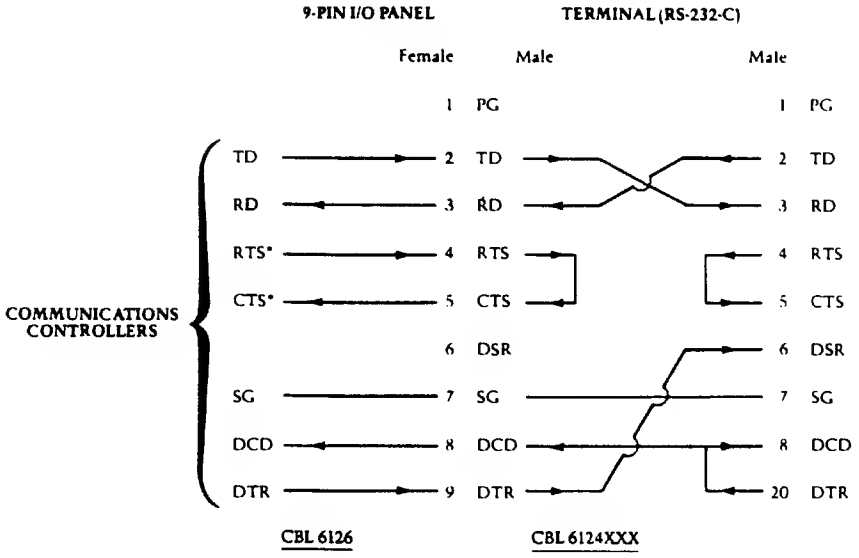


Figure 4-12. ICS2/3 Cabling (For All Systems)

NOTES:

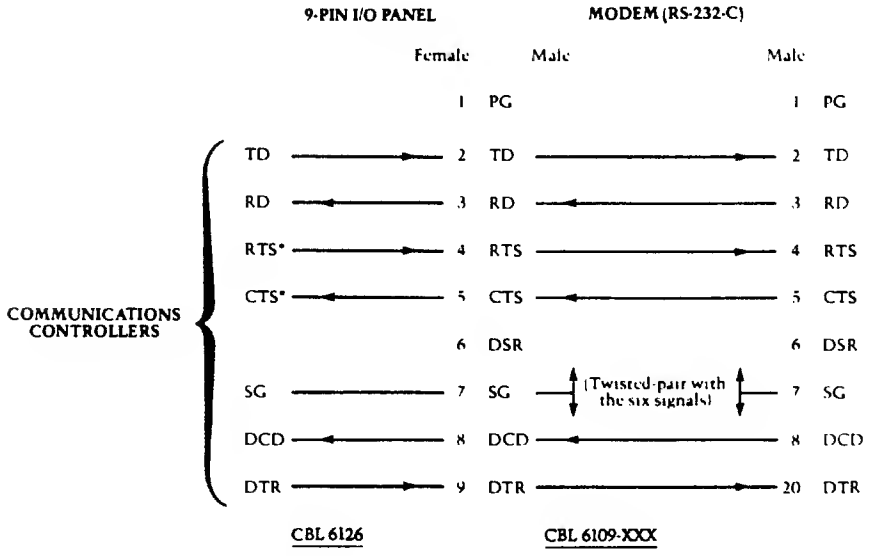
- All cable assemblies for the ICS2/3 from the controller to the ICS2 card cage, and from the card cage to the peripheral cabinet bulkhead, are included with the ICS2 and ICS3 subsystems.
- 5242 and 5725 (for use with non-FCC cabinets) includes a bulkhead panel that mounts on old-style 50 Series cabinets, and may include different internal cabling (external cables -- CBL6124 and CBL6109 will remain unchanged).
- External cables for the ICS3 are the same as those used for the ICS2.

Figures 4-13 and 4-14 show the pin positions and jumpers for FCC-compliant cables used with direct-connect and modem interfaces.



Notes: *RTS & CTS not supported on AMLC.

Figure 4-13. ICS1/ICS2/ICS3/AMLC Async Terminal Cable Pin-Out



Notes: *RTS & CTS not supported on AMLC

Figure 4-14. ICS1/ICS2/ICS3/AMLC Async Modem Cable Pin-Out

SYNCHRONOUS CABLE REQUIREMENTS

Cables required for the MDLC and ICS1 are not supplied with the controller and must be ordered as separate line items. The synchronous device cable requirements are summarized in Table 4-8.

TABLE 4-8. SYNCHRONOUS CABLE REQUIREMENTS

Data Sets	Controllers (Product Numbers)			
	5602 5604	5602F 5602-2250 5604F 5604-2250	5622 5624	5181 5181F 5181-2250
201A, B, C; 208A, B; DDS Interface (2K - 9.6K BPS)	CBL 1472	CBL 6127	See Note 1	CBL 6127
203A, B, C; 209A; DDS Interface (2K - 9.6K BPS)	CBL 1471	CBL 6127	See Note 1	CBL 6127
DDS Interface (56K BPS Only)	See Note 2	See Note 2	CBL 2278 See Note 2	See Note 2

Note 1: These areas in the table indicate non-supported device combinations.
Note 2: Not available on the 2250 system.

CBL1471 (For use with non-FCC systems)

CBL1471 is normally used to connect RS232-C modems (203A, B or C, or 209A types) or a DDS Interface (2000 to 9600 BPS). Each cable has two modem connectors. The length of CBL1471 is 9.2 meters (30 feet).

CBL1472 (For use with non-FCC systems)

CBL1472 is normally used to connect RS232-C modems (201A, B or C, or 208A or B) or a DDS Interface (2000 to 9600 BPS). Each cable has two modem connectors. CBL1472 is 9.2 meters (30 feet) long.

CBL2278 (For use with non-FCC systems)

CBL2278 is normally used for connecting to V.35/DDS CSU/DSUs, but only at speeds between 9600 and 64,000 bps. Each cable supports two lines. CBL2278 is 3.8 meters (12 feet) long.

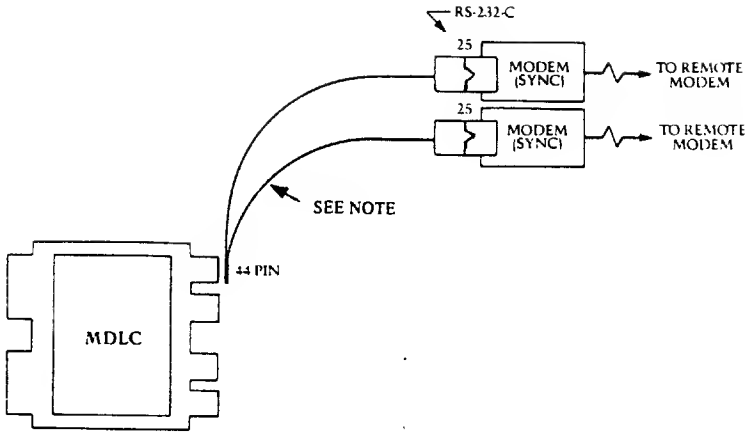


Figure 4-15. MDLC Cabling for Non-Bulkhead (Non-FCC Compliant Systems)

NOTE:

- Cabling assembly varies with the modem type. Modem types 203A, B or C and 209A use CBL1471; DDS Interface Modem (2000 to 9600 bps) use CBL1471 or CBL1472; Modem types 201A, B or C and 208A or B use CBL1472.

Synchronous Cabling for FCC-Compliant Systems and the ICS3

FCC-compliant communications controllers and synchronous ICS2 CLACs always include the appropriate internal cables, such as CBL6117. ICS3 Models 5730 and 5735 attach directly to the bulkhead, and therefore have no internal cables. All external cables for FCC-compliant systems and the ICS3 must be ordered separately.

CBL6127 (FCC-Compliant Systems and the ICS3)

CBL6127 is used to connect to V.24/RS232-C modems (Bell 201A/B/C or 208A/B), V.35/DDS interfaces between 2000 and 9600 bps, or synchronous data ports on a PBX. Refer to figures 4-9, 4-11 and 4-16.

CBL8466 (ICS3; CLAC502 and CLAC602 only)

CBL8466 is a null modem cable used to directly connect a V.24/RS232-C synchronous CLAC to another host's V.24/RS232-C synchronous port. One of the two pieces of equipment must provide external clocking. CLAC502/602s have the appropriate clocking circuitry to perform this function, if needed.

CBL8780 (FCC-Compliant Systems and the ICS3)

CBL8780 is used to connect to a V.35/DDS CSU/DSU (Channel Service Unit/Data Service Unit) or to a synchronous data port on a PBX, at speeds up to 64,000 bps.

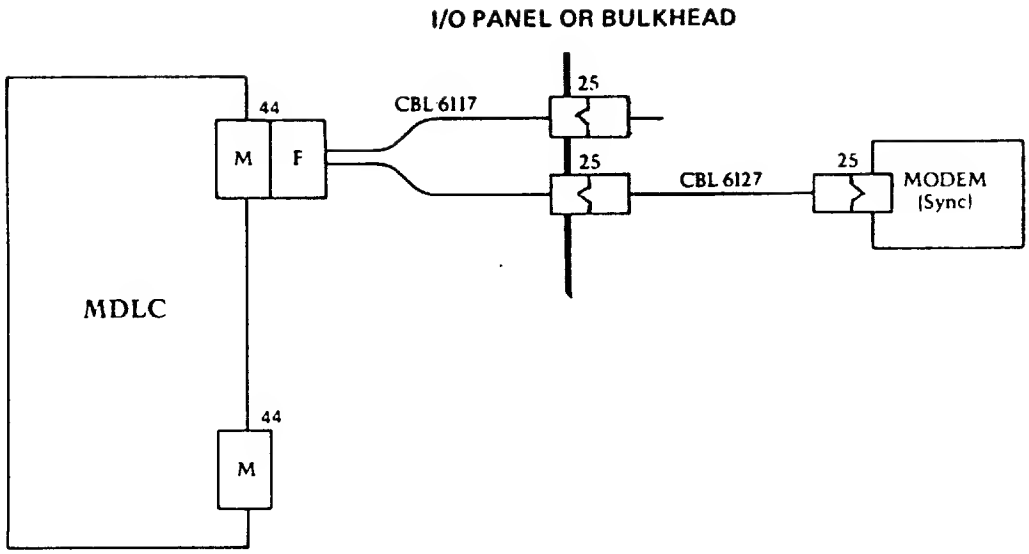


Figure 4-16. MDLC Cabling for FCC-Compliant Systems

NOTES:

- CBL6117 is bundled with FCC-compliant controllers.
- Only two synchronous lines are supported by a 2250 system.

PRIMENET Node Controller (PNC) Cable Requirements

One PNC Product Number (7041, 7041F, 7041T or 7041-2250) and one PNC Cable is required for each Prime System in the network. The aggregate distance between systems cannot exceed 230 meters (750 feet). The PNC Cable lengths and their corresponding type numbers are listed below.

Cable Product Number	Length
CBL3532	3.2 meters (10 feet)
CBL3533	15 meters (50 feet)
CBL3534	65 meters (200 feet)
CBL3535	166 meters (500 feet)

CBL1451 (Non-FCC Compliant Systems)

CBL1451 is used for the Paper Tape Reader (Product Number 3121) or the Paper Tape Reader of a Paper Tape Reader/Punch device (Product Number 3122 or 3123). In both cases, the SOC 3006 Controller is used. CBL1451 is 6.2 meters (10 feet) in length.

CBL1432 (Non-FCC Compliant Systems)

CBL1432 is used for the Paper Tape Punch of a Paper Tape Reader/Punch device (Product Number 3122 or 3123), with the SOC 3066 Controller. CBL1432 is 6.2 meters (10 feet) in length.

COMMUNICATIONS SOFTWARE

There are four product groups representing communications software available with Prime's 50 Series systems:

- PRIME/SNA
- Bisync Remote Job Entry (RJE) Emulators
- IBM Bisync 3270 Emulation and Support
- PRIMENET Networking

As a general rule, any mix of communications software can be configured on a Series system. Limitations, such as the number of synchronous lines supported by each member of the 50 Series family (currently eight for the 9655 and above), amount of system overhead and memory must be taken into consideration. Consult the following communications software summaries for individual product requirements.

PRIME/SNA

PRIME/SNA is a family of products that allows Prime systems to communicate with IBM hosts in SNA networks. At first release, PRIME/SNA consists of three components: the Server Subsystem, PRIME/SNA Interactive and PRIME/SNA RJE. Table 4-9 describes the components and their requirements.

TABLE 4-9. PRIME/SNA

Component	Product Number	Product Description	Requirements
PRIME/SNA Server Subsystem	8081-P	(See Note Below) Provides PU.T2 support for other PRIME/SNA product	ICS3; CLAC502/602 and CBL6127 (V.24/RS232) or CLAC522/622 and CBL8780 (V.35/DDS); 1/2MB additional memory, PRIMOS Rev.19.4 or later.
PRIME/SNA Interactive	8082-P	Allows PT200s to emulate IBM 3278 Models 2 and 5; LU.T1 and LU.T3 printing	PT200 PERFORMER Terminal; Server Subsystem
PRIME/SNA Remote Job Entry (RJE)	8083-P	Provides LU.T1 support for IBM 3776-3 (MLU) emulation	Server Subsystem; disk space evaluation
PRIME/SNA Core Product	8080-P	Includes PRIME/SNA Server, Interactive and RJE Subsystems	Same requirements for Server, Interactive and RJE, listed above

IBM Software Supported by PRIME/SNA

- Operating System: OS/VS2/MVS; MVS/XA; DOS/VSE; VM
- Network Software: ACF/VTAM; VTAME; ACF/NCP; VM/VCNA
- Network Management: NCCF; NPDA; NLDM
- Application Subsystems: (PRIME/SNA Interactive) TSO; CICS/VS; CMS; IMS/VS DB/DC; DSPRINT; JES/328X
- Application Subsystems: (PRIME/SNA RJE) DOS/VSE POWER; JES2

Configuration Rules

- Lines: PRIME/SNA allows users to run four high-speed lines concurrently, with speeds from 1,200 to 19,200 bps on V.24 (RS232) lines, and up to 64,000 bps on V.35 (DDS) lines. All four active lines must be resident on the same ICS2 controller. V.24 lines can be leased or switched. Leased V.24 and V.35 lines can be point-to-point, multipoint, or multi-multipoint. Synchronous lines can share the same ICS3 controller with asynchronous lines.

- Peripheral Nodes: Each PRIME/SNA Server configuration allows a Prime system to act as many as eight PU.T2 peripheral nodes.

- Logical Units: PRIME/SNA Interactive allows 40 LU ports to be configured as LU.T2 displays or LU.T1/LU.T3 logical printers for each PU.T2 peripheral node in the Server configuration. It also allows up to eight RJE sites to be active at one time. A maximum of 10 logical units may be configured per RJE site.

Table 4-10 shows that the number of active LUs supported by PRIME/SNA varies with CPU model. An LU port is considered active if it is engaged in a session with an SNA host.

TABLE 4-10. ACTIVE LUs SUPPORTED BY PRIME/SNA

CPU Model	Maximum Number of Active LU Ports
2250	16
2350	16
2450	32
550-II	32
750	32
850	32
2550	32
2655	32
9650	32
9655	32
9750	32
9755	32
9955	48
9955 II	48

Disk Usage

Users of the SNA/RJE subsystem may have a tendency to use more disk storage than initially anticipated. RJE products use the spooler subsystem, and therefore, an SNA/RJE site could require 5-10MB of additional disk space if the customer sends or receives large print files. This additional disk capacity should be ordered with the RJE subsystem. (Refer to PPA 209 for more information on PRIME/SNA.)

REMOTE JOB ENTRY (RJE) EMULATORS

A wide variety of mainframe RJE emulation packages are available with Prime 50 Series systems. The products and corresponding mainframe protocols are shown in Table 4-11.

TABLE 4-11. REMOTE JOB ENTRY (RJE) EMULATOR PRODUCTS

Emulator	Product Number	Protocol
EMX80	8020-P/M	IBM 2780/3780
EMXBM	8040-P/M	International Computers Limited (ICL) XBM
EM200UT	8060-P/M	Control Data Corp. (CDC) 200UT
EMHASP	8120-P/M	IBM HASP
EM1004	8180-P/M	Univac 1004
EM7020	8460-P/M	ICL 7020
EMGRTS	8470-P/M	Honeywell GRTS

To configure the emulators with the appropriate hardware, use Table 4-13. The key used in Table 4-12 references the key of Table 4-2.

TABLE 4-12. RJE EMULATOR/HARDWARE CONFIGURATION

RJE Emulator	Controller Key	Maximum Number of Lines	Memory
EMX80	a1,e5,e6,e8,f1,f2,f3	8	128KB
EMXBM	e6,e7,f1,f2,f3	4	128KB
EM200UT	e6,e7,f1,f2,f3	4	128KB
EMHASP	a1,e5,e6,e8,f1,f2,f3	8	128KB
EM1004	e6,e7	4	128KB
EM7020	e6,e7	4	128KB
EMGRTS	e8	8	128KB

Note the maximum number of lines that each RJE emulator supports. Generally, 128KB of system memory should be configured for each RJE protocol used. Mixed protocols, multiple lines or high-speed lines may require more memory.

RJE customers have a tendency to use more disk than initially anticipated. Therefore, advise the customer that an adequate number of disk devices should be ordered with the system. RJE products use the spooler subsystem, and therefore, an average RJE installation would require 5-10MB of additional disk space. If a customer expects to send or receive large print files, more disk space may be required.

At PRIMOS Rev. 19.3, EMHASP, EMGRTS and EMX80 (3780) support high-speed digital data links of up to 64,000 bps; EMX80 (2780) supports digital data links of up to 38,400 bps. At the same time, high average rates of data throughput are maintained. (Average throughput is another name for line utilization.) This capability is supported by the ICS3 and MDLC controllers listed in Table 4-2.

Table 4-13 can be used to roughly judge the impact of a high-speed link on a system configuration.

TABLE 4-13. IMPACT OF A HIGH-SPEED DATA LINK

RJE Emulator	Data Link Speed	Average Throughput %	CPU Resources (% of 750 CPU)
EMHASP	56K bps	60%	62%
EMX80(2780)	38K bps	60%	29%
EMX80(3780)	56K bps	60%	29%

Due to the amount of system resources required to support a high-speed data link, a customer must adhere strictly to these restrictions when configuring a system with line speeds greater than 9600 bps:

1. High-speed lines are not available on systems below the Prime 550-II.

2. Only one high-speed RJE or PRIMENET line per system.

3. Systems should be configured with an additional 256KB of memory.

4. As a guideline, a system with one high-speed line should not have more than one or two additional medium-speed synchronous lines (1200 to 9600 bps) in use by other communications products at the same time.

For more information about RJE at PRIMOS Rev. 19.3, refer to PMN 156.

IBM BSC 3270 EMULATION AND SUPPORT -- DPTX

With DPTX, Prime standard terminals and printers can emulate equipment in the IBM bisync (BSC) 3270 environment. DPTX also allows IBM BSC 3270 terminals access to resources on Prime systems, as well as a program interface and IBM printer emulation.

TABLE 4-14. IBM BSC 3270 EMULATION AND SUPPORT PRODUCTS

Product	Product Number	Description
DPTX	8430-P/M	Support of communication networks between Prime and IBM equipment

DPTX (Product Number 8430-P/M)

The Distributed Processing Terminal Executive (DPTX) facilitates communications between Prime and IBM equipment by supporting the BSC 3270 environment. DPTX supports or emulates up to 32 of the following devices per Prime 50 Series system:

- IBM 3271 Model 2 and 3277 Model 2 Display Systems
- 3284/86/88 Printers

DPTX supports up to eight, 9600 bps lines using IBM's binary synchronous communications protocol.

DPTX is compatible with all IBM mainframes using the System/370 architecture (including S/370, 4300, 303X, 308X and 309X), and a variety of other systems, access methods and telecommunications monitors, including:

- BTAM, TCAM, VTAM
- IMS/VS, CICS/VS
- TSO, VM/CMS

DPTX requires PRIMOS Rev. 19.3 or later, and may be configured on all 50 Series systems (including the 2250), as long as adequate memory is provided. Other communications products (emulators and networking software) may be configured on the same 50 Series system, but consult each product (in this section) for details.

DPTX includes three software modules:

1. Data Stream Compatibility (DPTX/DSC)

   DSC permits Prime terminals to emulate IBM 3277 display stations, and the Prime spooler to emulate IBM 3284/86/88 printers, allowing Prime equipment to communicate with IBM applications. Prime terminals and printers can also access Prime applications.

2. Terminal Support Facility (DPTX/TSF)

   TSF allows a customer to connect IBM 3277 display stations and 3284/86/88 printers directly to a 50 Series system. IBM terminals can access PRIMOS and utilities, while IBM printers can print Prime generated reports.

3. Transparent Connect Facility (DPTX/TCF)

   DPTX/TSF allows IBM 3277 display stations connected to a Prime system to communicate with both IBM and Prime applications.

Configuration guidelines for these modules are provided in Table 4-15. Note that the key used in Table 4-15 references the key in Table 4-2.

TABLE 4-15. DPTX HARDWARE/MEMORY CONFIGURATION

DPTX Module	Maximum # of Users	Maximum Lines	Key	Memory
DPTX/DSC	32 *	8 **	e5,e6,e8	256KB
DPTX/TSF	32 *	8 **	e5,e6,e8	256KB
DPTX/TCF	16 *	8 **	e5,e6,e8	512KB ***

* Combined maximum number of users of DPTX/DSC and DPTX/TSF is 32.

Maximum number of users of DPTX/TCF is 16. (Each user of DPTX/TCF actually uses one DTPX/TSF and one DPTX/DSC user slot.)

** Maximum number of MDLC lines which can be connected to an IBM host.

*** Note that DPTX/TCF incorporates both DPTX/TSF and DPTX/DSC; therefore, the maximum amount of memory configured for DPTX would not exceed 512KB.

Table 4-16 lists the Prime standard terminals supported by DPTX:

TABLE 4-16. TERMINALS - DPTX 3277 EMULATION
PT200, PST100 Revision E (Refer to PPA 172 and PMN 158 for details), PT45, and OWL1200

Customers are responsible for obtaining the necessary modems for their particular requirements, e.g., multi-drop leased (private) line, and also for obtaining any IBM equipment (mainframe, terminal controllers, terminals) used with the DPTX configuration.

For more information about DPTX at PRIMOS Rev. 19.3, refer to PMN 158.

PRIMENET NETWORKING

The following products support networking and networking applications for the Prime 50 Series:

TABLE 4-17. NETWORKING PRODUCTS		
Product	Product Number	Description
PRIMENET	8440-P/M 8440-PU	Support of communication systems involving point-to-point leased, point-to-point dial-up and local area networks.
PRIMENET/w Packet Network Interface	8450-P/M 8440-PU	Support of PRIMENET and X.25 packet-switched data networks.
File Transfer Service	8480-P/M	Queued transfer of files on all PRIMENET and X.25 packet-switched data networks. Prerequisites are 8440 or 8450.

PRIMENET (Product Numbers 8440-P/M and 8440-PU)

PRIMENET provides a variety of transmission methods and services to support network communications, including remote login, Remote File Access (RFA), NETLINK and Interprocess Communications Facility (IPCF). PRIMENET will run on any 50 Series system at PRIMOS Rev. 18.2 or later.

PRIMENET can be utilized in local area networks (LANs) by connecting several systems that are in close proximity to each other. This facility, RINGNET, allows up to 128 systems to be linked in a local area network.

The PRIMENET Node Controller (PNC) connects 50 Series systems in a local area network using a token passing ring architecture. Each system connected to RINGNET needs a PRIMENET license, a PRIMENET Node Controller (PNC) and appropriate cabling. For a 3-node ring, the order should include three PRIMENET licenses (one per system). The PNC takes up one CPU board slot. The maximum cable length between active PNCs (and therefore each node) is 230 meters (750 feet). If a system fails, a relay inside the PNC assists in securing RINGNET facilities (provided that the total length between active nodes is no more than 230 meters). Cable requirements are covered in greater detail later in this section.

For local area networks requiring distances greater than 750 feet between nodes, the Custom Systems Group offers a RINGNET Repeater. For more information, see PB 1536, or the Custom Systems Group Sales Guide (SOU-2301-004).

So far we have only discussed ring networks. PRIMENET supports the following types of networks with the following topologies:

- Local area network (RINGNET)
- Point-to-point full-duplex synchronous (leased/private)
- Point-to-point half-duplex synchronous (dial-up)
- X.25 packet-switched data network (leased)
- Point-to-satellite digital networks (see PF4262 for more details)

All synchronous PRIMENET communications require either an MDLC with a Bisync or HDLC protocol option, or an ICS1 with PRIMOS Rev. 19.3 or later. At PRIMOS Rev. 20.1, the ICS3 will run full-duplex PRIMENET. Point-to-point, half-duplex synchronous connections require the MDLC with the bisync protocol option. Only the MDLC supports half-duplex PRIMENET. Table 4-18 shows PRIMOS and communication controller support for half- and full-duplex PRIMENET.

TABLE 4-18. PRIMOS AND COMMUNICATIONS CONTROLLER SUPPORT SUPPORT FOR HALF- AND FULL-DUPLEX PRIMENET

	Type of Communications Controller:		
	MDLC	ICS1	ICS3
Full-Duplex	PRIMOS Rev. 18.2 and above	PRIMOS Rev. 19.3 and above	PRIMOS Rev. 20.1 and above
Half-Duplex	PRIMOS Rev. 18.2 and above; except Rev. 19.3	None	None

At PRIMOS Rev. 19.3 and later, PRIMENET supports three synchronous lines (out of a possible eight lines on the 50 Series), and speeds at up to 64,000 bps (one line at a speed greater than 19,200 bps, the other two at lower speeds). Please note that the 2250 supports a a maximum of two PRIMENET synchronous lines.

Table 4-19 illustrates PRIMOS revision support and hardware configuration information involving synchronous PRIMENET communications. Note that the key used in Table 4-19 references the key of Table 4-2.

At PRIMOS Rev. 19.3, PRIMENET allows communications between two nodes NOT directly connected by using intermediate nodes as gateways. This is known at Route-Through Gateway support. For more informatino, see PMN 273 and the Route-Through Installation Guidelines Sales Guide (SOU-7403-000).

Please refer to PMN 166 for more information on PRIMOS Rev. 19.3's PRIMENET features and configuration limits.

At PRIMOS Rev. 19.4, PRIMENET offers Monitor Net, a valuable tool for monitoring network activity and diagnosing network problems. With Monitor Net, customers can analyze network activity with a PT200, PST100, PT45, FOX or OWL terminal, or archive data for later analysis. Monitor Net provides overview and detailed information on RINGNET (available at Rev. 19.3), synchronous lines, and virtual circuits. For more detailed information about Monitor Net, see PPA 206.

TABLE 4-19. SYNCHRONOUS PRIMENET SUPPORT				
	H A L F - D U P L E X (MDLC ONLY)			
Dial-Up	Rev. 19.2 and earlier	Rev. 19.3	Rev. 19.4	Rev. 20.1
Supports:	MDLC	No Support	MDLC	MDLC
	F U L L - D U P L E X (MDLC, ICS1 AND ICS3)			
Leased	Rev. 19.2 and earlier	Rev. 19.3	Rev. 19.4	Rev. 20.1
Supports:	MDLC	ICS1, MDLC	ICS1, MDLC	ICS1, MDLC, ICS3
Note that the ICS1 and ICS3 are down-line loaded from PRIMOS and do not require firmware protocol options. The MDLC supports only two protocol sets per board.				

Cables for the MDLC, ICS1 and ICS3 must be ordered as a separate line item. Modems cannot be ordered from Prime; customers must purchase them. More detailed cable information is found later in this section.

PRIMENET with Packet Network Interface (Product Numbers 8450-P/M and 8440-PU)

PRIMENET with the packet-switched network interface license supports all of the previously listed functions and configuration guidelines of PRIMENET. The following information explains attaching to packet-switched data networks.

PRIMENET allows a system to connect two different PSDNs (such as Telenet and Tymnet) on each synchronous line. PRIMENET does not support more than one synchronous line to the same PSDN.

PRIMENET meets the internationally-recognized 1980 CCITT X.25 standard for packet-switching networks, allowing 50 Series systems to communicate easily with any other system (public or private) that complies with the X.25 standard (via the packet-switching network). PRIMENET supports both the 1976 LAP (bisync and HDLC) and 1980 LAPB (HDLC) specifications. With the packet network interface license, PRIMENET supports many X.25 packet-switched networks. When configuring the system for packet network communications, the packet carrier must be contacted to determine which specific protocol is required.

Most support the bisync protocol at this time; however, the HDLC protocol is more efficient and should be used when available. Consult your Regional Communications Specialist for assistance in connecting to your national packet-switching networks, as some are currently phasing-out bisync support.

Among the PSDNs that PRIMENET supports are: Telenet, Tymnet, Autonet and Alaskanet in the United States; Datapac in Canada; Great Britain's International Packet-Switching Service (IPSS); and France's Transpac. PRIMENET also supports the European Packet-Switching Network, Euronet. These are just a few of the packet-switching networks that PRIMENET supports today.

For more information about PRIMENET at PRIMOS Rev. 19.3, please refer to PMNs 148 and 166 and the PRIMENET Product Bulletin (PB1417-004).

File Transfer Service (Product Number 8480-P/M)

File Transfer Service (FTS) is a powerful utility providing trouble-free, controlled data movement throughout a distributed network of Prime systems. FTS is a queued transfer service. When a user submits a transfer request, FTS takes care of the entire operation without further attention or operator intervention. Thus, a request for a file to be sent to a remote system can be submitted at any time, regardless of the current network status. If the transfer is not possible because the network link or node is not functioning, FTS will automatically recover and retry at regular intervals until the transfer succeeds. In addition, a sub-routine call interface is available for application developers.

The purchase of FTS is recommended for all point-to-point, dial-up and X.25 public data networks. FTS may also be used to transfer files which reside on Prime local area networks. (Real-time, non-queued file transfers on Prime local area networks are supported by PRIMOS commands.) At PRIMOS Revs. 19.3 and 19.4 (FTS Rev. 2), FTS will transfer simple files, as well as MIDASPLUS and V-mode program run files. FTS Rev. 2 does not support transfers of segment directory-based files such as ROAM, DBMS or RBF files.

FTS may be installed on any Prime node in a PRIMENET network. PRIMENET is, of course, a prerequisite. One copy of FTS must be ordered for each node using it, although each node in the network need not have FTS installed if it is not needed.

FTS Rev. 1 can only transfer SAM and DAM files. FTS Rev. 1 also makes transferred SAM files into DAM destination files if the files don't exist at the remote site.

Table 4-20 shows FTS dependencies on PRIMOS revs.

TABLE 4-20. FTS DEPENDENCIES ON PRIMOS REVISIONS		
FTS Revision	PRIMOS Revision Release On:	Runs on PRIMOS Revision:
1.0	18.4	18.2 and above
1.0	19.0	18.2 and above
1.1	19.1, 19.2	19.0 and above
2.0	19.3, 19.4	19.0 and above

For more information on FTS, please refer to PMN 165.

The following tables (Tables 4-21 to 4-24) summarize the dependencies of hardware and software.

TABLE 4-21.
COMMUNICATIONS HARDWARE SUBSYSTEMS
50 SERIES CONFIGURATION LIMITS

Subsystems	Maximum Per System	Required Board Slots
ICS1	4	1
ICS2	4	1
ICS3	4	1
PNC2	1	1
AMLC	8	1
MDLC	2	1

TABLE 4-22.
MAXIMUM CONTROLLER COMBINATIONS

Combination *	Maximum Number
Mixed Synchronous Controllers (MDLC, ICS1 and ICS3)	2
Mixed Asynchronous Controllers (AMLC, ICS1, ICS2 and ICS3)	**
Mixed ICS Controllers (ICS1, ICS2 and ICS3)	4

* Mixed synchronous controllers, for example, means any controller which supports synchronous communications and is being configured to operate synchronously on a Prime 50 Series system. Both the ICS1 and ICS3 may be configured to support synchronous and/or asynchronous communications.

** NOTE: There is no limit on the number of asynchronous controllers. However, there may be no more than 256 asynchronous lines present (configured or not) in the system.

TABLE 4-23. MDLC - PRIMOS REVISION DEPENDENCIES

DEPENDENCY	18.3	19.1	19.2	19.3	19.4 and later
Asynchronous Devices	No	No	No	No	No
RJE - HASP 3780 GRTS	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 64,000	Yes w/ maximum speed = 64,000
RJE - 2780	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 38.4KB	Yes w/ maximum speed = 38.4KB
RJE - 200UT 1004 7020	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600
RJE - XBM	No	Yes w/ maximum speed = 19.2KB	Yes w/ maximum speed = 19.2KB	Yes w/ maximum speed = 19.2KB	Yes w/ maximum speed = 19.2KB
DPTX - Distributed Procesessing Terminal Executive	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600
PRIMENET - Dial-UP (HDX)	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	No	Yes w/ maximum speed = 9600
PRIMENET - Dedicated Line (FDX) (X.25)	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 9600	Yes w/ maximum speed = 64K bps	Yes w/ maximum speed = 64K bps
SNA - Interactive	No	No	No	No	No
SNA - RJE	No	No	No	No	No

TABLE 4-24. ICS1 - PRIMOS REVISION DEPENDENCIES*				
DEPENDENCY	19.1	19.2	19.3	19.4
Asynchronous Devices	Yes	Yes	Yes	Yes
RJE - HASP 2780/3780	Yes w/ maximum speed = 4800	Yes w/ maximum speed = 4800	Yes w/ maximum speed = 4800	Yes w/ maximum speed = 4800
RJE - 200UT, 1004 GRTS, 7020, XBM	No	No	No	No
DPTX (Distributed Processing Terminal Executive)	No	No	No	No
PRIMENET - Dial-up (HDX)	No	No	No	No
PRIMENET - Dedicated Line (FDX) (X.25)	No	No	Yes w/ HDLC only maximum speed = 9600	Yes w/ HDLC only maximum speed = 9600
SNA - Interactive	No	No	No	No
SNA - RJE	No	No	No	No
* ICS1 NOT supported prior to Rev. 19.1.				

TABLE 4-25. ICS2/3 - PRIMOS REVISION DEPENDENCIES			
DEPENDENCY	19.2/19.3	19.4/20.0	20.1
Asynchronous Devices	Yes	Yes	Yes
RJE - HASP 2780, 3780 200UT, 1004, GRTS, 7020, XBM	No	No	Yes; 2780, 3780 and HASP only
DPTX - Distributed Processing Terminal Executive	No	No	No
PRIMENET - Dial-up (HDX)	No	No	No
PRIMENET - (X.25) Dedicated Line (FDX)	No	No	Yes
SNA - Interactive	No	Yes	Yes
SNA - RJE	No	Yes	Yes
* ICS2 NOT supported prior to Rev. 19.2.			

TABLE 4-26. VALID HARDWARE/SOFTWARE COMBINATIONS (UP TO PRIMOS REVISION 20.1)

SOFTWARE PRODUCT	MDLC	PNC	ICS1	ICS3
Asynchronous Devices	No	No	Yes*	Yes
RJE - HASP 2780/3780	Yes - use PROM 5646, 5650 or 5654	No	Yes* w/ maximum speed = 4800 bps	Yes
RJE - 200UT 1004 XBM, 7020	Yes - use PROM 5650, 5651	No	No	No
RJE - GRTS	Yes - use PROM 5654	No	No	No
DPTX - Distributed Processing Terminal Executive	Yes - use PROM 5646, 5650 or 5654	No	No	No
PRIMENET - RINGNET	No	Yes	No	No
PRIMENET - Dial-Up (HDX)	Yes* - use PROM 5646, 5650 or 5654	No	No	No
PRIMENET - Dedicated Line (FDX)	Yes - use PROM 5646, 5650 5651, 5654	No	Yes*	Yes
PRIMENET - X.25	Yes - use PROM 5646, 5650 5651, 5654	No	Yes*	Yes
SNA - Interactive	No	No	No	Yes
SNA - RJE	No	No	No	Yes

* PRIMOS revision dependent

SECTION 5

CABINET CONFIGURATION REQUIREMENTS

2250 SYSTEM REQUIREMENTS

The 2250 system has three types of cabinets: the 2250 system cabinet, the 2250 peripheral cabinet and the 7653L peripheral cabinet. The only peripherals available in the 2250 peripheral cabinets are 68/158MB disks and streaming tape drives. The streaming tape, 315MB disk drive and ICS2 can be mounted in the 7653L peripheral cabinet.

2250 System Cabinet Space Allocation

The system cabinet of the 2250 houses an entire system, including:

- CPU chassis, power supply, backplane, peripheral controllers, Diagnostic Processor and an I/O Bulkhead convenience panel
- Up to two 68/158MB disks (product numbers 464X and 465X, respectively)
- Up to two cartridge tape drives (Product Number 4651-2250)

Figure 5-1 shows a rear-view of the 2250 system cabinet with the back panel removed.

2250 Disk Peripheral Cabinet Space Allocation
(Model Number 7652-2250)

The 2250 disk peripheral cabinet can only be used to add up to two additional 68/158MB disks to the system. The 2250 peripheral cabinet is included when the third disk (Product Number 4643-2250 for the 68MB or 4653-2250 for the 158MB) is ordered. The fourth drive (Product Number 4644-2250 or 4654-2250) is mounted in the cabinet supplied with the third disk. Only 2250-style disks may be mounted in this cabinet (see Figure 5-2).

2250 Streaming Magnetic Tape Subsystem Peripheral Cabinet Space Allocation

The streaming tape peripheral cabinet on the 2250 can only be used to add up to two streaming tape drives to the system. The 2250 peripheral cabinet is included when the first drive (packaged or Product Number 4660-2250) is ordered. The second drive (Product Number 4661-2250) is mounted in the cabinet supplied with the first drive. Only a second streaming drive may be mounted in this cabinet (see Figure 5-3).

7653L Peripheral Cabinet (Model Number 7653L)

The 7653L peripheral cabinet (Model Number 7653L) is used to house up to two 315MB disk drives, an ICS2 or streaming tape drive. The peripheral cabinet is included when ordering packages containing the 315MB drive (see Figure 5-4).

When a second 315MB disk drive is added to the 2250-019 system, the 7653L cabinet must also be ordered. This configuration makes use of two 7653L cabinets in total, since one comes packaged with the 2250-019.

When a second 315MB disk and a second Streamer are added to a 2250-019 system, the 315MB disk drives must be placed one above the other, in one 7653L cabinet; the Streaming Tape drives must be placed one above the other in the second 7653L cabinet.

2250 Desktop Extension (Model Number 7560-2250)

An extension may be ordered for the 2250 that provides a desktop area to the right of the 2250 system. This desktop unit (Product Number 7560-2250) is adjustable to two heights.

2250 Cabinet Specifications

Specifications for the 2250 system cabinet and 2250 peripheral cabinets are summarized in Tables 5-1 and 5-2.

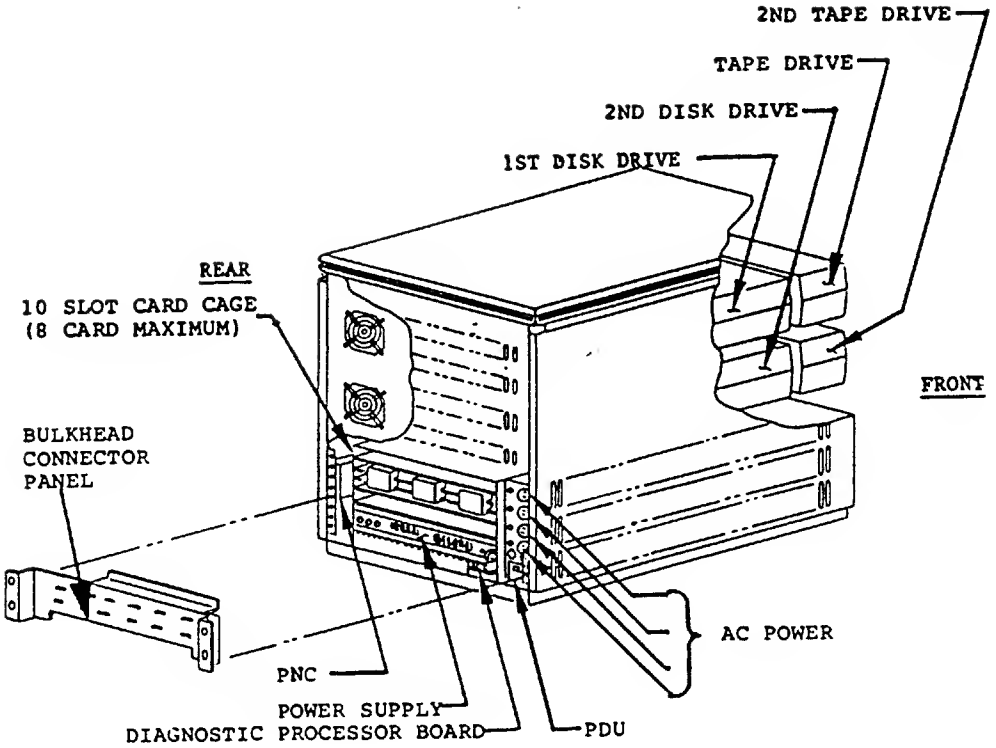


Figure 5-1. 2250 System Cabinet with Back Panel Removed

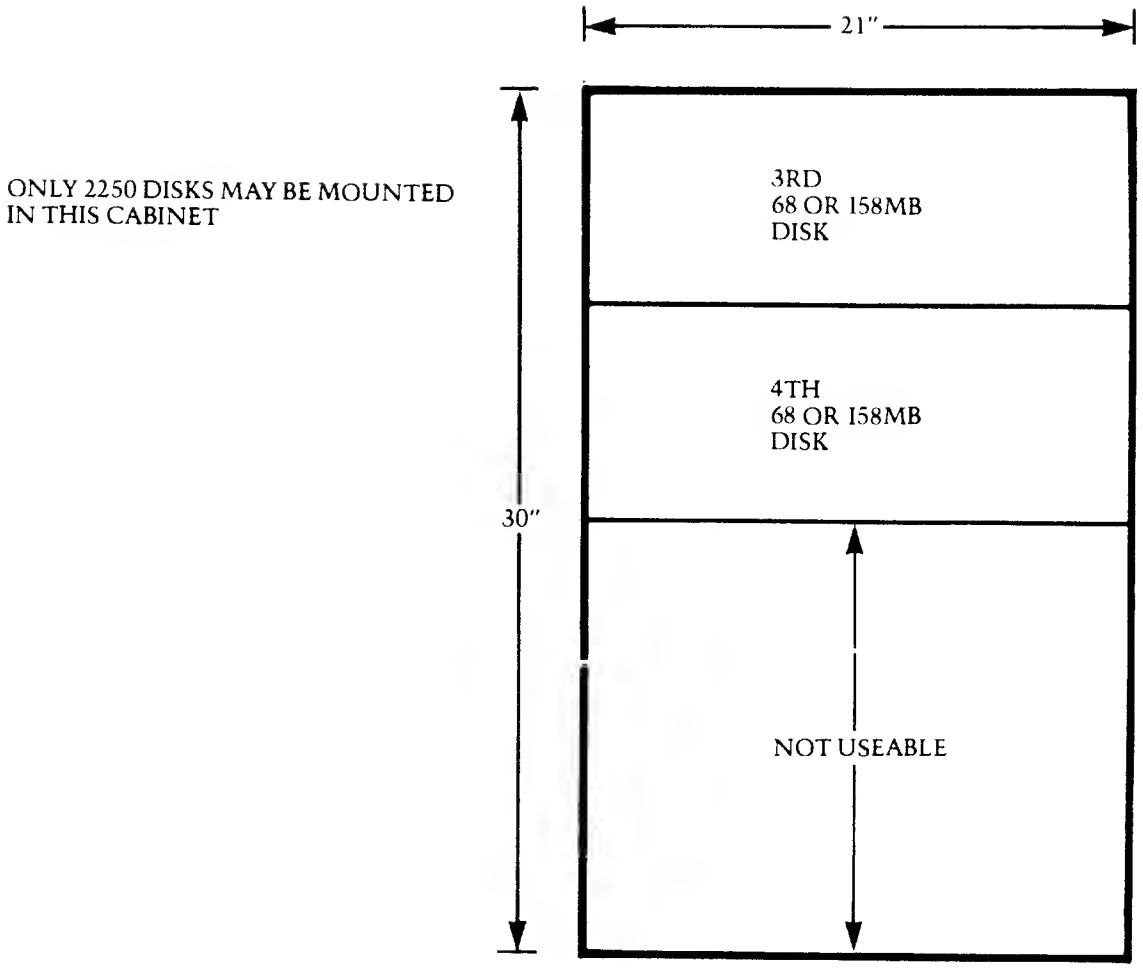


Figure 5-2. 2250 Disk Peripheral Cabinet

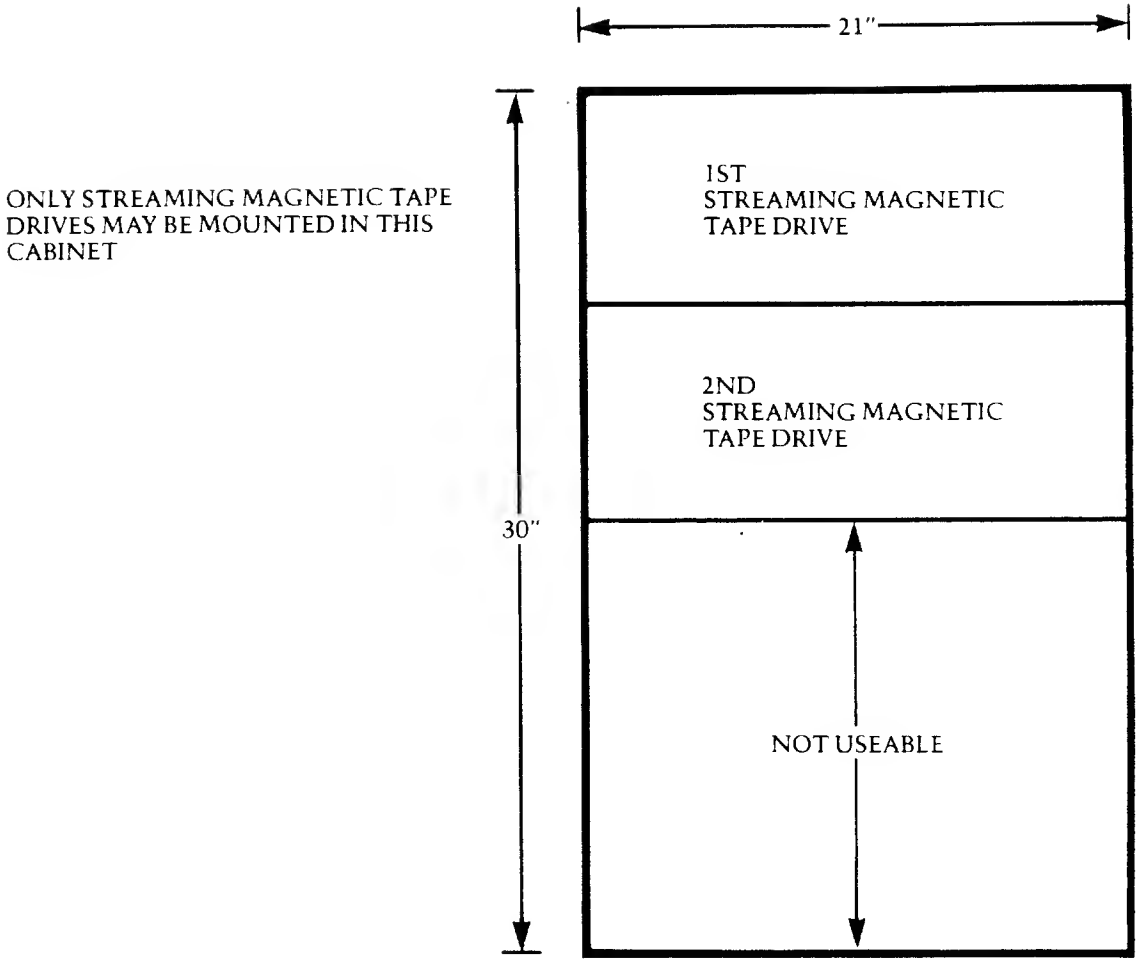
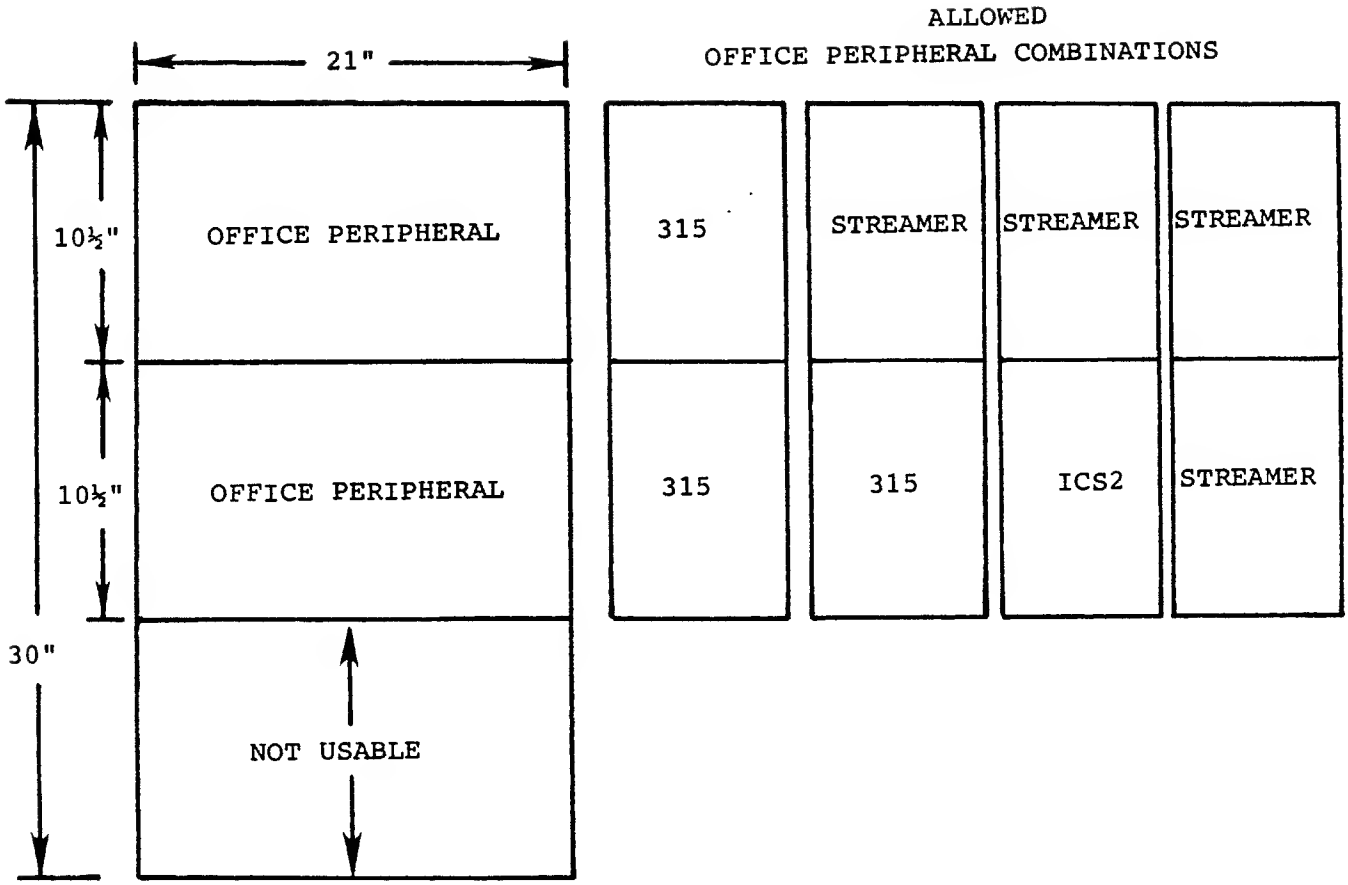


Figure 5-3. 2250 Streaming Magnetic Tape Peripheral Cabinet Space Allocation



315 = 315MB FIXED MEDIA DISK
STR = STREAMING MAGNETIC TAPE SUBSYSTEM
ICS2 = INTELLIGENT COMMUNICATIONS SUBSYSTEM MODEL II

Figure 5-4. 7653L Office Peripheral Cabinet (For Use with 2250 Systems)

2350 AND 2450 SYSTEM REQUIREMENTS

The 2350 and 2450 systems have two types of cabinets: the 2350 and/or 2450 system cabinet, and the Streaming Magnetic Tape Subsystem cabinet. The only peripheral available in the Streaming Magnetic Tape Subsystem cabinet is the Streaming Magnetic Tape Drive. Refer to Appendix A for cabinet specifications.

2350 and 2450 System Cabinet Space Allocation

The system cabinet of the 2350 (or 2450) houses an entire system, including:

- CPU chassis, power supply, backplane, peripheral controllers, Diagnostic Processor and an I/O bulkhead
- Up to two disks of 60MB and 120MB formatted capacities (Product Numbers 4711 and 4715)*
- One QIC/600 5-1/4 inch Cartridge Tape Drive
- ICS1, AMLC or ICS3 Communications Controllers

Figure 5-5 shows a cut-away view of the 2350 (2450) system cabinet.

Figures 5-5A and 5-5B show examples of the I/O Bulkhead.

2350 and 2450 Streaming Magnetic Tape Subsystem Peripheral Cabinet Space Allocation

The office peripheral cabinet (7653L) can only be used to add one Streaming Magnetic Tape Drive to the 2350 or 2450 system. No other peripherals may be mounted in this cabinet.

* Please note that a 2350 or 2450 may be configured with a mixed disk configuration of 60MB and 120MB disks.

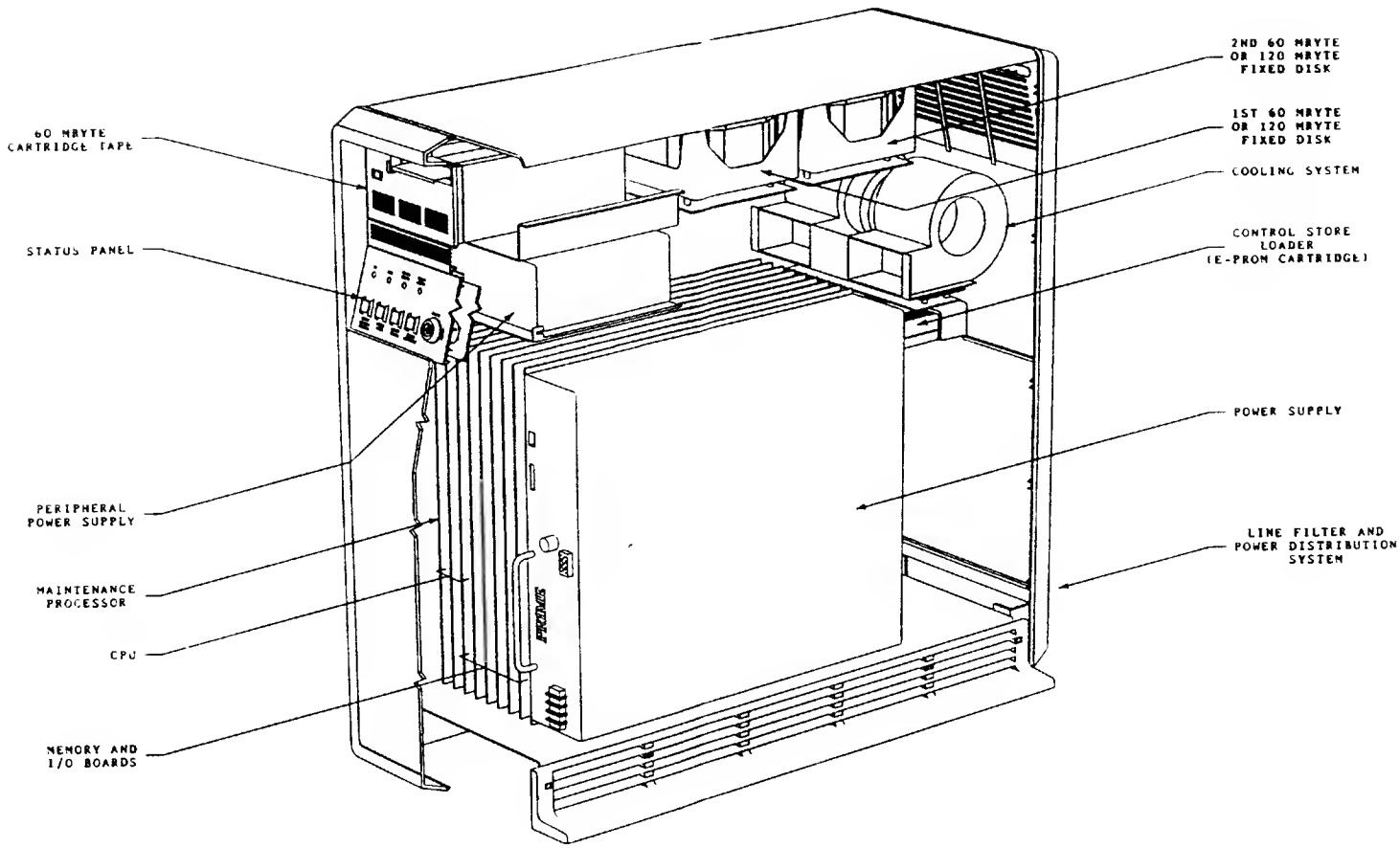


Figure 5-5. 2350/2450 System Cabinet (Cut-Away View)

2350/2450 BULKHEAD CONFIGURATION EXAMPLES

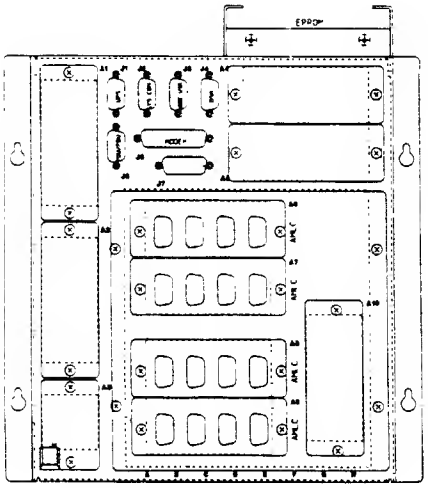


Figure 5-5A.

Standard System Package
with 16-Line AMLC

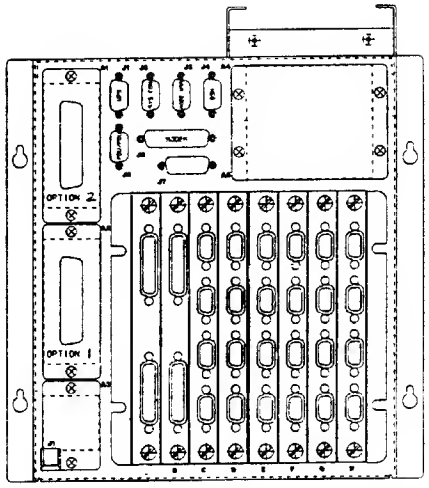


Figure 5-5B.

System Package with ICS3,
24 Asynchornous Lines and
4 Synchronous Lines

2655 SYSTEM REQUIREMENTS

The 2655 has two types of cabinets: the 2655 system cabinet and the 2655 office peripheral cabinet. The only peripherals available in the 2655 office peripheral cabinet are the 315MB FMD, streaming tape, cartridge tape and the Intelligent Communications Subsystem Model 2 (ICS2).

2655 System Cabinet Space Allocation

The system cabinet of the 2655 houses the following components:

- CPU chassis, backplane, modem for 60Hz system
- Power distribution unit (PDU), power supply
- CPU boards, memory boards, peripheral controllers, communications controllers
- Diagnostic Processor, I/O bulkhead

Figure 5-6 is a rear-view of the system cabinet with the back panel removed.

2655 Office Peripheral Cabinet Space Allocation

The peripheral cabinet of the 2655 is used for housing the 315MB FMD, 1/2 inch streaming tape, cartridge tape and the ICS2 in the office environment. All 2655 packaged systems having the 315MB FMD as the first device include the office peripheral cabinet. If more space is required when ordering additional rack-mounted peripherals, an additional office peripheral cabinet (Product Number 7653L) must be ordered (see Figure 5-7).

2655 Cabinet Specifications

Specifications for the 2655 and 2655 office peripheral cabinet are found in Appendix A.

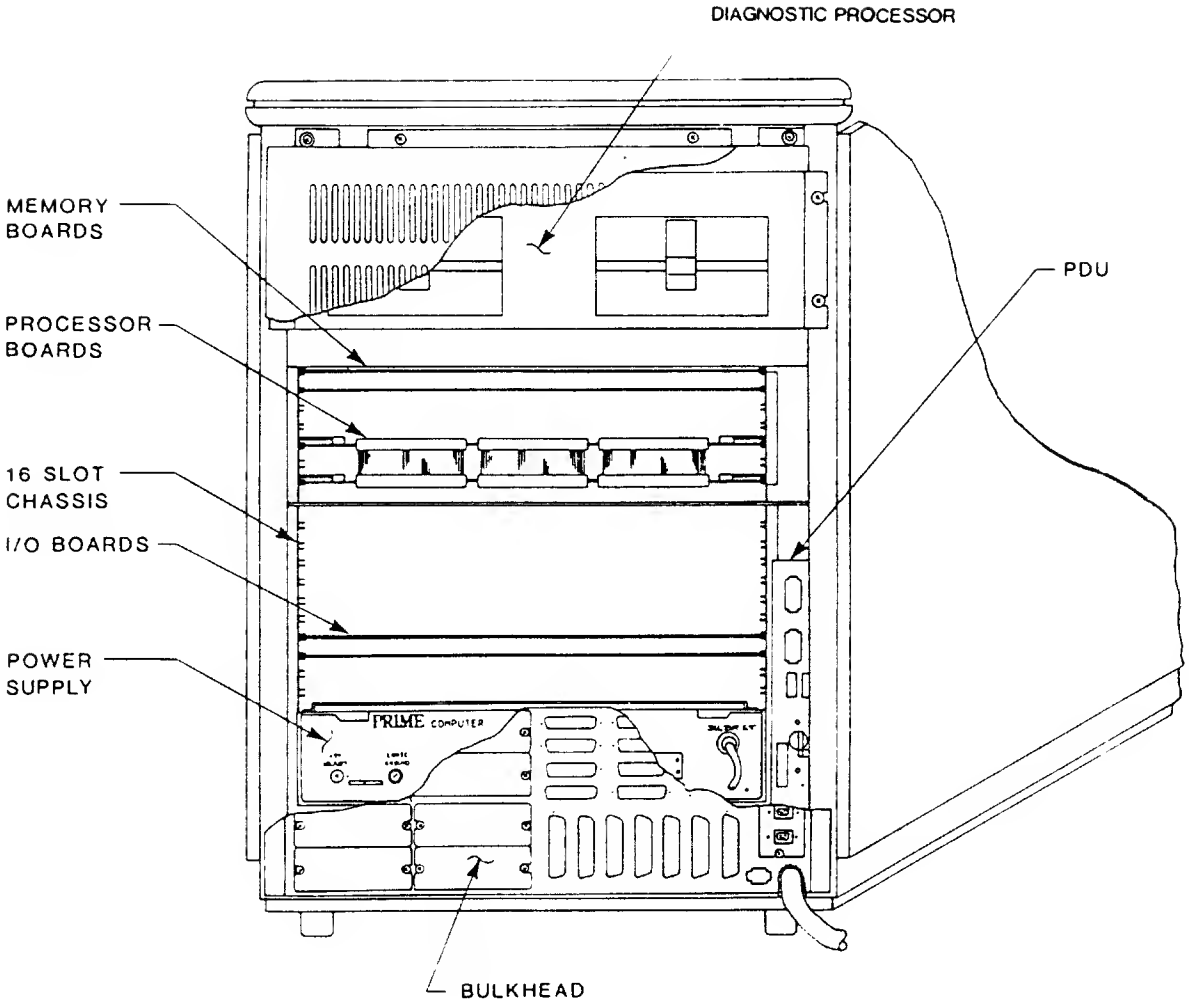


Figure 5-6. 2655 System Cabinet with Back Panel Removed

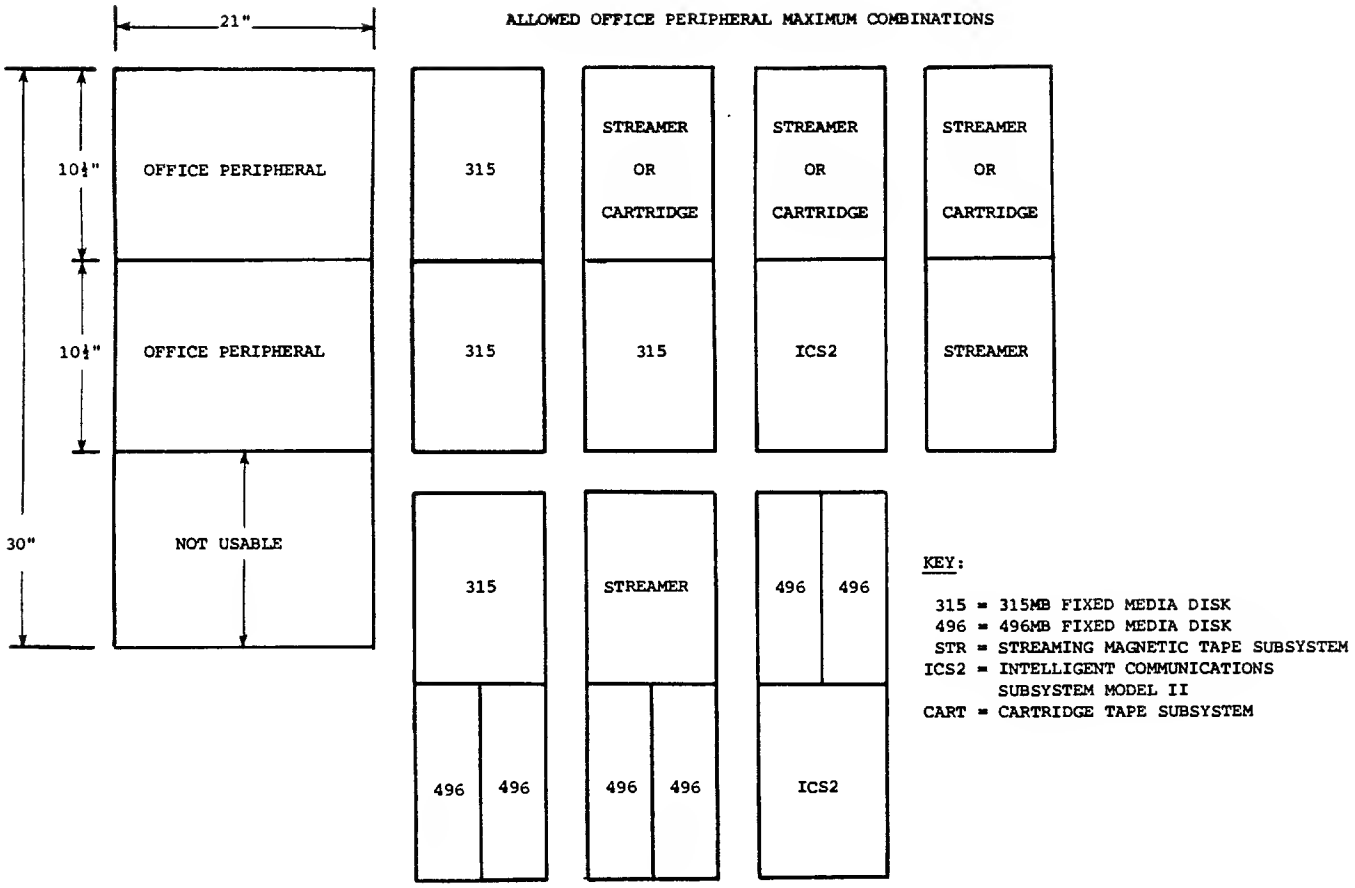


Figure 5-7. 7653L Office Peripheral Cabinet

9655 SYSTEM CABINET REQUIREMENTS

The 9655 utilizes a Product Number 7650F system cabinet (Figure 5-8) and a Product Number 7651F* and/or 7564S* peripheral cabinet(s), (Figures 5-10 and 5-11). The standard configuration for the 9655 is described below.

9655 System Cabinet Space Allocations

The system cabinet is used to house the CPU chassis.
NOTE: NO PERIPHERALS MAY BE INSTALLED IN THE 9655 SYSTEM CABINET.

- CPU Chassis - The CPU chassis is comprised of a 16-slot card cage and backplane assembly, and is installed in the system cabinet. The CPU chassis is located in the top of the system cabinet.
- Main Memory - The system cabinet contains board positions for installing up to eight memory boards.
- Peripheral Devices - Installation of peripheral devices is not allowed in the system cabinet.
- I/O Chassis - The I/O chassis is comprised of a 19-slot chassis and backplane assembly, and is installed below the CPU chassis in the system cabinet. The I/O chassis can be configured with up to 10 controllers.
- Two Basic Types of Peripheral Cabinets - The 9655 may be configured with the 7564S peripheral cabinet, which may be configured with up to eight (8) 496MB fixed media disks.

* The 9655 utilizes the 7651F peripheral cabinet under the following circumstance ONLY:

- When the prospect orders the 4551F GCR tape drive.

9655 Cabinet Specifications

Specifications for the system cabinet and peripheral cabinet(s) used with the 9655 are summarized in Appendix A.

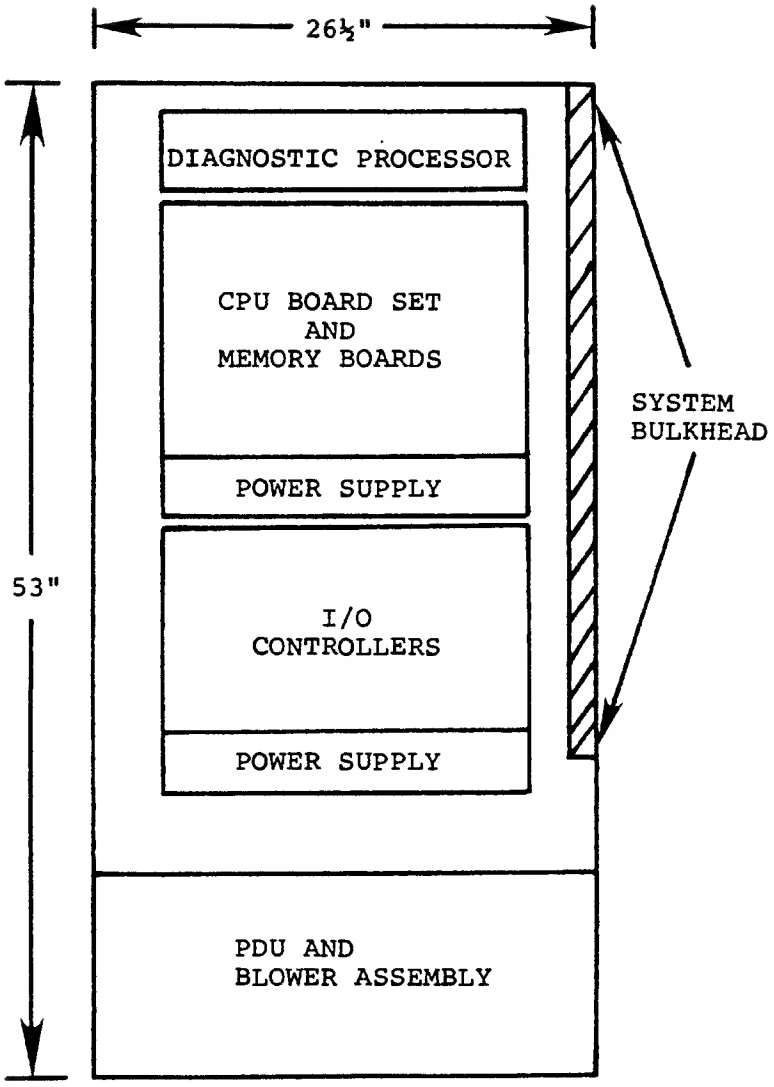


Figure 5-8. 9655 System Cabinet Space Allocation

9755 AND 9955 II SYSTEM CABINET REQUIREMENTS

Prime's 9755 and 9955 II systems utilize two Product Number 7650F system cabinets and Product Number 7651F* and/or 7564S peripheral cabinet(s). A description of the cabinets and their standard configurations follows:

9755 and 9955 II System Cabinets Space Allocation

The two system cabinets (Product Number 7650F) used to house the system are configured as Cabinet A and Cabinet B. System cabinet space allocation and configuration requirements are illustrated in Figure 5-9 and described below.

- Cabinet A - is the CPU and main memory cabinet. The CPU chassis contains the CPU board set, memory controller and two ECL power supplies. The memory chassis contains eight (8) memory slots and a standard power supply.

- Cabinet B - contains the I/O controllers and up to two power supplies. Cabinet B (and the I/O controllers) connects to Cabinet A via the appropriate I/O cables. The 9755 supports a maximum of 10 I/O controller boards; the 9955 II supports a maximum of 14. Cabinet B also houses the Diagnostic Processor and its separate power supply.

- Peripheral Devices - No peripheral devices may be installed in either Cabinet A or B. Any cabinet-mounted peripherals must be mounted in a peripheral cabinet.

* The 9755 and 9955 II utilize the 7651F peripheral cabinet under the following circumstance ONLY:

- When the prospect orders the 4551F GCR tape drive.

9755 and 9955 II Cabinet Specifications

Specifications for the system and peripheral cabinet(s) used with the 9755 and 9955 II are summarized in Appendix A.

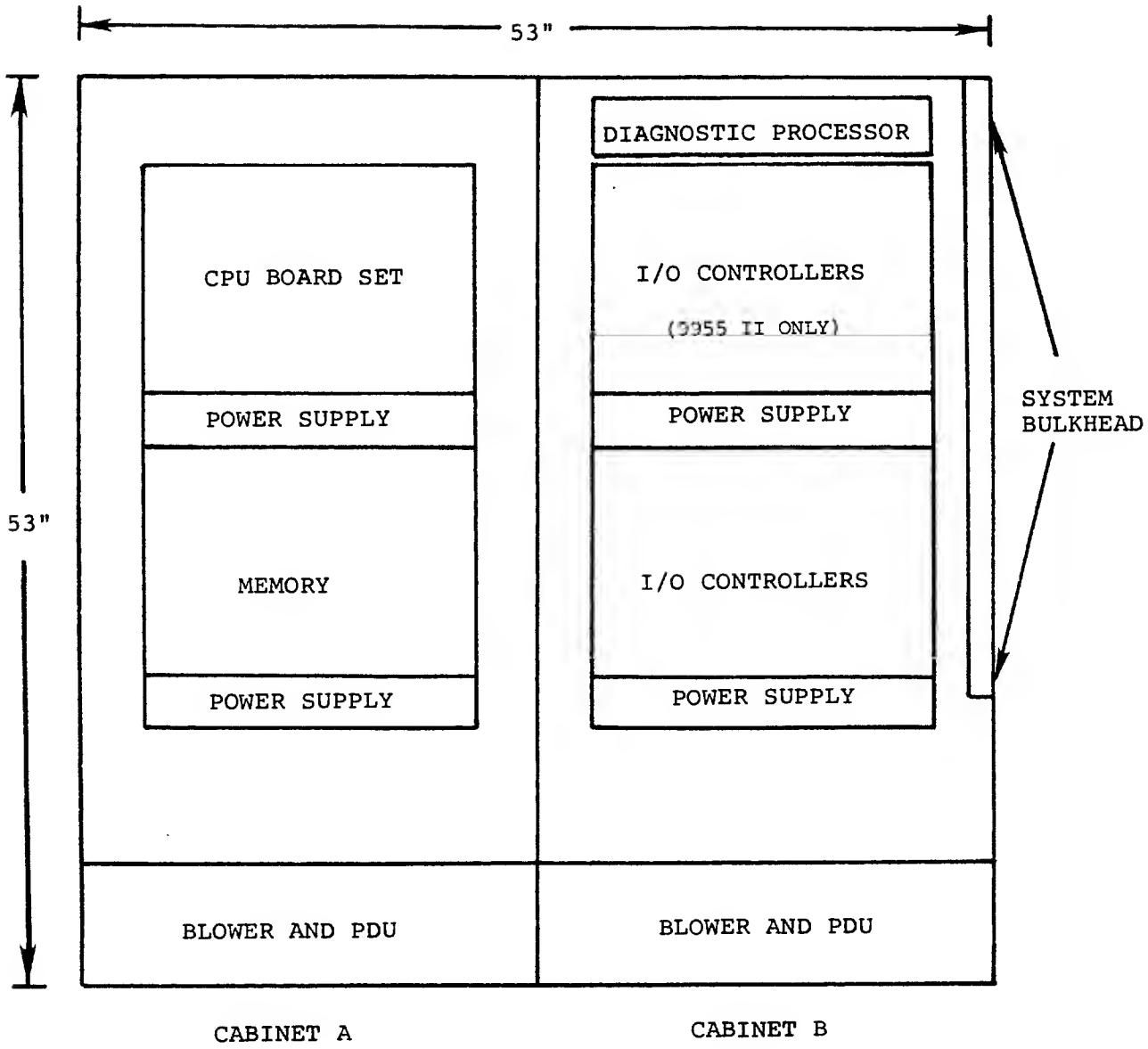


Figure 5-9. 9755 and 9955 II System Cabinet (Rear-View) Space Allocation

9655, 9755 AND 9955 II PERIPHERAL CABINET SPACE ALLOCATION

7651F Peripheral Cabinet

The 7651F Peripheral Cabinet is used to house 50 Series rack-mounted peripherals, and is being replaced by the 7564S Peripheral Cabinet. Mounting space in the peripheral cabinet(s) is allocated in the following priority order: magnetic tape transports, disk drives, and other optional devices that are installed in the upper half of the cabinet. All unused space, from the bottom of the installed peripheral(s) to the bottom of the cabinet, is enclosed using filler panels. Space allocation and configuration requirements for the major peripheral devices installed in the peripheral cabinet(s) are illustrated in Figures 5-10 and 5-11.

- Magnetic Tape Transport - The magnetic tape transport (MTT) is installed in the upper portion (upper 24-1/2") of the cabinet, as illustrated in Figure 5-10. Only one MTT may be installed per cabinet.

- Other - Disk drives that may be installed in the peripheral cabinet(s) are the rack-mounted devices: the Cartridge Module Disk (CMD) and the Fixed Media Device (FMD/160MB, 315MB and 496MB), Streaming Tape, 15MB cartridge tape, and ICS2 card cages may also be installed in the peripheral cabinet.

If a magnetic tape transport (MTT) is installed in the cabinet, one cabinet-mounted device may be installed in the 10-1/2 inch space below the MTT, as shown in Figure 5-10.

If no MTT is installed in the cabinet, three cabinet-mounted peripherals that occupy one 10-1/2 inch rack each can be installed in the peripheral cabinet. If an ICS2 card cage is installed, the ICS2 occupies one 10-1/2 inch rack; this leaves two 10-1/2 inch racks available for cabinet mounted peripherals (see Figure 5-11).

The 7651F cabinet supports up to two ICS2 card cages; when two are configured in the cabinet, one 10-1/2 inch rack remains open between them for cooling.

Configuring the 7651F Peripheral Cabinet with 496MB Disks

The 7651F cabinet supports up to three (3) 315MB FMDs; each occupying one (1) 10-1/2 inch space. The 7651F also supports the 496MB disk, but close attention must be paid to the following configuration guidelines:

1. A maximum of two (2) 496MB disks may be configured in the cabinet. The only combination supported is one (1) 4735F and one (1) 4738F (first and add-on disk drives).

2. The 4735F and 4738F may be configured in any 10-1/2 inch rack space in which a 315MB FMD could be configured. The 4735F and 4738F each occupy half of one 10-1/2 inch cabinet-mounted peripheral space.

3. No configuration can exceed a total of four peripherals in the cabinet.

Based on these configuration rules, the 7651F peripheral cabinet can be configured with up to two 315MB disks and two 496MB disks; provided the 496MB disks have Product Numbers 4735F and 4738F.

NOTE: The 496MB disk (Model Number 4736) is not supported on the 7651F cabinet because it is a right disk drive and controller. Proper bulkheading is not available for cables.

TYPES OF PERIPHERALS THAT MAY BE CONFIGURED IN THE 7651F CABINET:

* CABINET-MOUNTED PERIPHERALS MAY BE ONE OF THE FOLLOWING:
  - CMD DISK
  - 160MB FMD DISK
  - CARTRIDGE TAPE (15MB)
  - HALF-INCH STREAMING TAPE*
  - ICS2 CARD CAGE
  - 315MB FMD DISK
  - (2) 496MB FMD DISKS (PRODUCT NUMBERS 4735F AND 4738F) CAN OCCUPY ONE RACK SPACE AVAILABLE. EACH DISK DRIVE OCCUPIES HALF OF ONE 10-1/2 INCH CABINET-MOUNTED PERIPHERAL SPACE.

  * MULTIPLE STREAMING TAPE DRIVES MUST BE MOUNTED IN THE SAME PERIPHERAL CABINET.

NOTE: MODEL 4550 (OLD-STYLE) GCR TAPE DRIVES FILL AN ENTIRE PERIPHERAL CABINET, LEAVING NO ADDITIONAL MOUNTING ROOM.

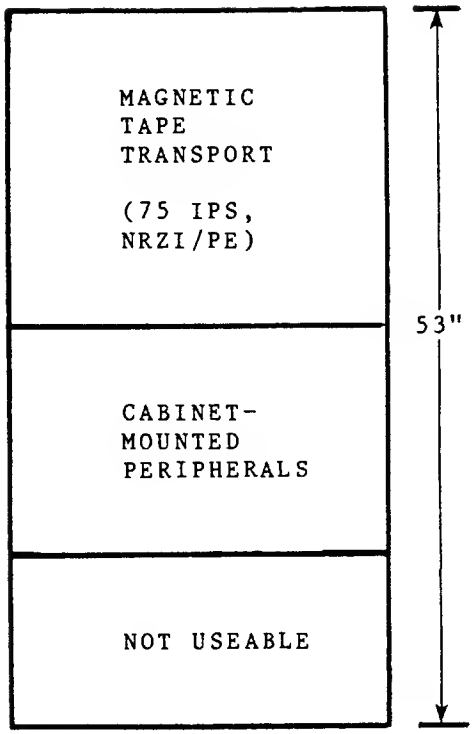


Figure 5-10. 7651F Peripheral Cabinet with NRZI/PE Magnetic Tape Space Allocation

CABINET SPACE OCCUPIED BY PERIPHERALS THAT MAY BE CONFIGURED IN THE 7651F CABINET:

* CABINET-MOUNTED PERIPHERALS CAN CONSIST OF THE SAME OR A MIX OF THE FOLLOWING DEVICES:
  - CMD DISKS (OCCUPIES 1 (RACK SPACE)
  - 160MB FMD DISKS (OCCUPIES 1 RACK SPACE)
  - 315MB FMD DISKS (OCCUPIES 1 RACK SPACE)
  - CARTRIDGE TAPE (OCCUPIES 1 RACK SPACE)
  - STREAMING TAPE (SEE NOTE)
  - (2) 496MB DISKS (PRODUCT NUMBERS 4735F AND 4738F); OCCUPIES 1 RACK SPACE. EACH DISK DRIVE OCCUPIES HALF OF A 10-1/2 INCH CABINET-MOUNTED PERIPHERAL SPACE.

* IN ADDITION, ICS2 CARD CAGES MAY BE MOUNTED UNDER THE FOLLOWING RULES:
  - MAXIMUM OF (2) ICS2 CARD CAGES ONLY .
  - (1) ICS2 CARD CAGE, AND UP TO 2 OTHER DEVICES FROM THE ABOVE LIST.

NOTE: MULTIPLE STREAMING TAPE DRIVES MUST BE LOCATED IN THE SAME PERIPHERAL CABINET; EACH DEVICE REQUIRES ON RACK SPACE.

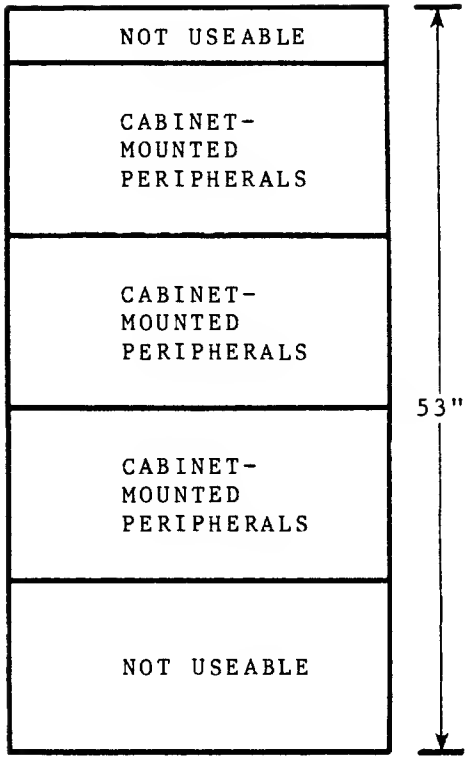


Figure 5-11. 7651F Peripheral Cabinet Space Allocation

7564S Peripheral Cabinet

The new 7564S peripheral cabinet houses all current 50 Series peripheral devices. The peripheral cabinet contains four standard 10-1/2 inch rack slots. All 50 Series rack-mountable disk and tape devices are designed to be housed in a given number of rack slots. These peripherals include the 800/1600 BPI and 6250 BPI tape transports, 1/2 inch Streaming Tape unit, 315MB FMD, 496MB FMD and the ICS2 and ICS3 communications subsystems. Space allocation and configuration requirements for the major peripheral devices which can be installed in the peripheral cabinet(s) are illustrated in Figures 5-12, 5-13 and 5-14.

The new 7564S peripheral cabinet has the same dimensions as the 7651F peripheral cabinet. The cabinets may be mixed on the same system, and appear as a matched pair in appearance.

The 7564S peripheral cabinet contains its own power distribution unit (PDU) and meets all FCC requirements.

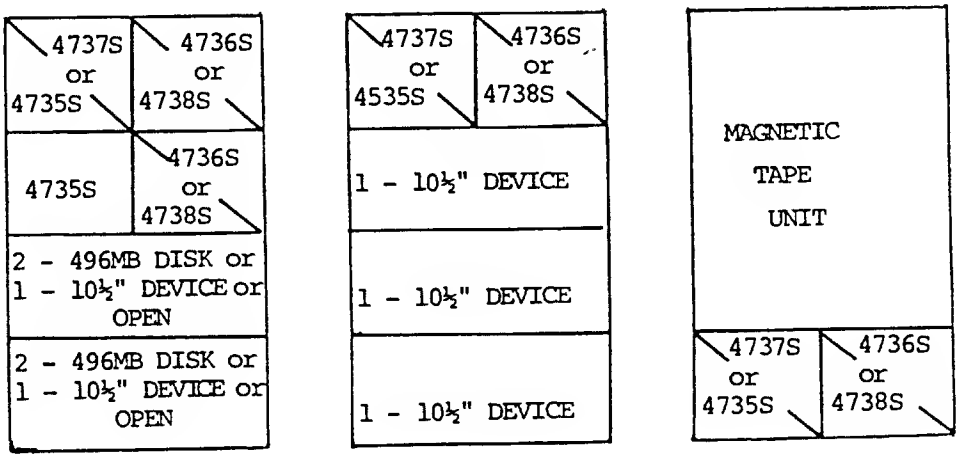
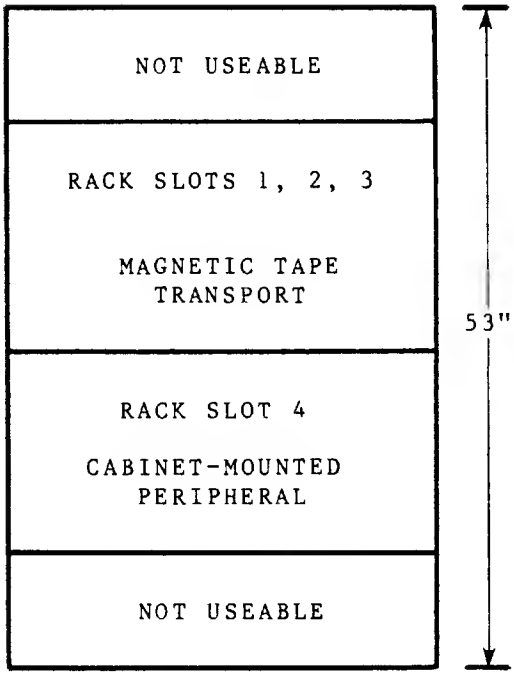


Figure 5-11. Examples of Possible 7564S Peripheral Cabinet Configurations

TYPES OF PERIPHERALS THAT MAY BE CONFIGURED IN THE 7564S CABINET:

* MAGNETIC TAPE TRANSPORTS CAN BE ONE OF THE FOLLOWING:
  - 800/1600 BPI TAPE TRANSPORT (4522S)
  - 6250 BPI TAPE TRANSPORT (4590S)

* CABINET-MOUNTED PERIPHERALS CAN BE ONE OF THE FOLLOWING:
  - 315MB FMD (447XS)
  - 496MB FMD (473XS)
  - 1/2 INCH STREAMING TAPE (4660S)
  - ICS2 (5720S or 5242S)*
  - REFER TO FIGURE 5-14 FOR ICS3 CONFIGURATIONS.



NOTE: For additional information on the configurable disks and peripheral products, please refer to Section 2 - Disk Subsystems.

* A maximum of one ICS2 may be configured in the 7564S cabinet.

FIGURE 5-12. 7564S Peripheral Cabinet

NUMBER OF RACK SLOTS NECESSARY TO CONFIGURE PERIPHERALS IN THE 7654S PERIPHERAL CABINET:

1) TWO 496MB FMDs CAN BE MOUNTED IN A RACK SLOT. THEREFORE, UP TO EIGHT 496MB FMDs MAY BE CONFIGURED IN ONE CABINET.

2) ONE 315MB FMD IS CONFIGURABLE PER SLOT, THEREFORE, UP TO FOUR 315MB FMDs MAY BE CONFIGURED IN ONE CABINET.

3) BOTH THE 800/1600 BPI TAPE TRANSPORT (4522S) AND THE 6250 BPI TAPE TRANSPORT (4590S OR 4592S) OCCUPY THREE RACK SLOTS. THE RACK SLOT IMMEDIATELY BELOW THE TAPE UNIT MAY BE USED TO CONFIGURE TWO 496MB DISKS OR ONE 315MB DISK.

4) THE 1/2 INCH STREAMER TAPE UNIT OCCUPIES ONE RACK SLOT. STREAMER TAPES SHOULD BE INSTALLED IN THE BOTTOM SLOTS FIRST (RACK SLOTS 3 OR 4) BEFORE USING RACK SLOTS 1 AND 2.

5) THE ICS2 COMMUNICATIONS SUBSYSTEM REQUIRES TWO RACK SLOTS IF CONFIGURED WITH A 315MB FMD, 496MB FMD, AND/OR STREAMER TAPE UNIT (ONE RACK IS FOR THE ICS2, THE OTHER IS FOR COOLING).

IF A 800/1600 BPI TAPE TRANSPORT OR THE 6250 BPI TAPE TRANSPORT IS CONFIGURED, THE REMAINING RACK SPACE MAY BE USED TO CONFIGURE ONE ICS2 CARD CAGE. (AN OPEN COOLING SPACE IS NOT REQUIRED IN THIS CASE.)

NOTE: A MAXIMUM OF ONE ICS2 CARD CAGE MAY BE CONFIGURED IN THE 7564S CABINET.

REFER TO FIGURE 5-14 FOR ICS3 CONFIGURATIONS.

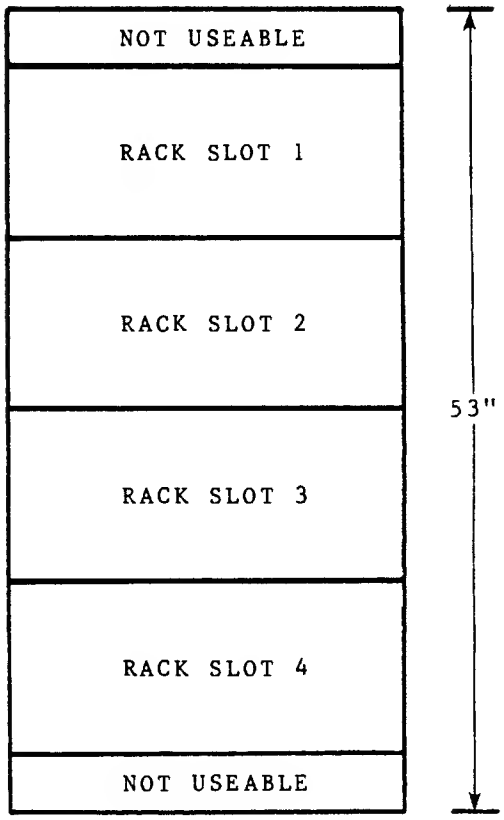


Figure 5-13. 7564S Peripheral Cabinet

- TWO ICS3s CAN BE HOUSED IN THE REAR OF RACK SLOTS 3 AND 4.
- STREAMER TAPE DRIVES CAN BE HOUSED IN RACK SLOTS 3 AND 4 WITH ICS3s.
- RACK SLOTS 1 AND 2 CAN HOUSE THE 496MB OR THE 315MB DISKS, OR ANY OTHER RACK SLOT PERIPHERAL DEVICE.
- TWO ICS3s CAN ALSO BE HOUSED WITH MAGNETIC TAPE TRANSPORTS (4590S).

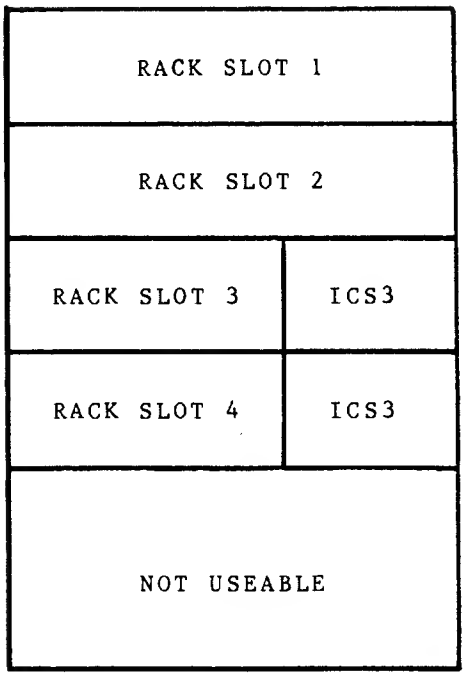


Figure 5-14. 7564S Side View

APPENDIX A

SYSTEMS SPECIFICATIONS

2250 SYSTEM CABINET

Specifications for the 2250 system is shown below for convenient reference.

Physical Dimensions

	DOMESTIC	INTERNATIONAL
Height	30 inches	76 cm
Width	21 inches	53 cm
Depth	31 inches	79 cm
Weight (fully loaded)	350 lbs	159 kgs

Electrical/Heat Dissipation

Volts	104 - 127	208 - 254
Frequency, Hz	59 - 61	49 - 51
Current (amps)	14.5	7.5
Demand (KVA)	1.7	1.7
Input Power (watts)	1.3	1.3
Heat Dissipation	4500 BTU/hr	1134 Kcal/hr
NEMA Plug	5-20P	

NOTE: Domestic units are defined as 60Hz systems. International units are defined as 50Hz systems.

Environmental

Temperature:		
Operational	59 - 86 °F	15 - 30 °C
Storage	-40 - 140 °F	-40 - 60 °C
Humidity:		
Operational (non-condensing)	20 - 80%	20 - 80%
Storage (non-condensing)	0 - 95%	0 - 95%
Altitude:		
Operational	7,000 ft.	2,100m
Storage	40,000 ft.	12,200m
Acoustical	Not to exceed 55 dBA	
Air Quality	Normal ofice environment	
Electrostatic	0-5KVDC with no failures	

2250 PERIPHERAL CABINET SPECIFICATIONS

68MB/158MB DISK OR STREAMER CABINET

	DOMESTIC	INTERNATIONAL
Height	30 in	76 cm
Width	21 in	53 cm
Depth	31 in	79 cm
Weight (Empty)	140 lbs	63.5 kgs

Environmental

Temperature	59 - 86 °F	15 - 30 °C
Relative Humidity	20 - 80%	20 - 80%
Heat Dissipation	30 BTU/hr	7.56 Kcal/hr

315MB DISK (7653L) CABINET

Height	30 in	76 cm
Width	21 in	53 cm
Depth	31 in	79 cm
Weight (empty)	140 lbs	63.5 kgs

Environmental:

Temperature	59 - 86 °F	15 - 30 °C
Relative Humidity	20 - 80%	20 - 80%
Heat Dissipation	30 BTU/hr	7.56 Kcal/hr

2350/2450

Specifications for all 2350/2450 systems are shown below for convenient reference.

System Cabinet

	DOMESTIC	INTERNATIONAL
Height	29 inches	73.7 cm
Width	11.3 inches	28.7 cm
Depth	30.3 inches	77.0 cm
Weight (fully loaded)	142 lbs	64.4 kgs

Electrical/Heat Dissipation:

Volts	104 - 127	208 - 254
Current, Amps	8.2	4.1
Startup Current (Amps, 1 AC cycle)	110	110
Frequency, Hz	59 - 61	49 - 51
Demand, KVA	1.1	1.0
Input Power, Watts	660	660
Heat Dissipation	2300 BTU/hr	579.6 Kcal/hr
NEMA Plug	5-20P	

NOTE: Domestic units are defined as 60Hz systems. International units are defined as 50Hz systems.

Environmental:

Temperature		
Operational	50 - 95 °F	10 - 35 °C
Storage	-40 - 140 °F	-40 - 60 °C
Relative Humidity		
Operational (Non-Condensing)	10 - 90%	10 - 90%
Storage (Non-Condensing)	10 - 95%	10 - 95%
Altitude		
Operational	8,000 ft.	2,400m
Storage	40,000 ft.	12,200m

Acoustical	Not to exceed 55 dBA
Air Quality	Normal Office Environment
Electrostatic	0-5KVDC with no failures

2350/2450 PERIPHERAL CABINET SPECIFICATIONS

	DOMESTIC	INTERNATIONAL
Streamer Cabinet:		
Height	30 inches	76 cm
Width	21 inches	53 cm
Depth	31 inches	79 cm
Weight (Empty)	140 lbs	63.5 kgs
Streamer	80 lbs	36.3 kgs
Total Weight	220 lbs	99.8 kgs
Environmental:		
Temperature	59 - 86 °F	15 - 30 °C
Relative Humidity	20 - 80%	20 - 80%
Heat Dissipation (Without Devices)	30 BTU/hr	7.56 Kcal/hr

2655

Specifications for the 2655 system are given below for convenient reference.

System Cabinet:

	DOMESTIC	INTERNATIONAL
Height	30 inches	76 cm
Width	21 inches	53 cm
Depth	31 inches	79 cm
Weight (Fully loaded)	250 lbs	113.4 kgs

Electrical/Heat Dissipation:

Volts	104 - 127	208 - 254
Frequency, Hz	59 - 61	49 - 51
Current, Amps	10.4	5.2
Start-up Current (Amp peak, 3 AC Cycles)	170	170
Demand, KVA	1.2	1.2
Input Power, KWatts	.9	.9
Heat Dissipation/Hr.	3100 BTU's	781.2 Kcal
NEMA Plug	5-20P	LS-30

Environmental:

Temperature	59 - 90 °F	15 - 30 °C
Relative Humidity	20 - 80%	20 - 80%
Altitude	8,000 ft	2,400 m

2655 PERIPHERAL CABINET SPECIFICATIONS

Cabinet Size:

Height	30 inches	76 cm
Width	21 inches	53 cm
Depth	31 inches	79 cm
Weight (Empty)	140 lbs	63.5 kgs

Environmental:

Temperature	59 - 86 °F	15 - 30 °C
Relative Humidity	20 - 80%	20 - 80%
Heat Dissipation (Without devices)	30	7.56

9655

Specifications for the 9655 system are given below for convenient reference.

System Cabinet:

	DOMESTIC	INTERNATIONAL
Height	53.0 inches	134.6 cm
Width	26.25 inches	66.7 cm
Depth	35.25 inches	89.5 cm
Weight (fully loaded)	600 lbs (est.)	272 kgs (est.)

Electrical/Heat Dissipation:

Volts	104-127	208-254
Frequency, Hz	59-61	49-51
Circuits	1 2	1
Current, Amps	14.4 8.3	12.5 (est.)
Demand, KVA	1.7 .99 (=2.7)	2.7 (est.)
Input Power, Watts	1.2 .63 (=1.8)	1.8 (est.)
Heat Dissipation	3990 2150 (=6140) BTU/hr	1537.2 (est.) Kcal/hr
NEMA Plug	L14-30	LS-30
Start-up Current (Amp peak, 3 AC Cycles)	170	170

Environmental:

Temperature	59 - 90 °F	15 - 32 °C
Relative Humidity	20 - 80%	20 - 80%
Altitude	8,000 ft	2,400 m

9655 PERIPHERAL CABINET SPECIFICATIONS

Peripheral Cabinet:

Height	53 in	134.6 cm
Width	26.5 in	67.3 cm
Depth	35 in	88.9 cm
Weight (Empty)	280 lbs	120 kgs

Environmental:

Temperature	59 - 86 °F	15 - 30 °C
Relative Humidity	30 - 80%	30 - 80%
Heat Dissipation (Without devices)	286 BTU/hr.	72.07 Kcal/hr.

9755

Specifications for the 9755 system are given below for convenient reference.

System Cabinet (Dual Bay):

	DOMESTIC	INTERNATIONAL
Height	53.0 inches	134.6 cm
Width	53.0 inches	134.6 cm
Depth	35.25 inches	89.5 cm
Weight (Fully loaded)	R=584/L=750 lbs	R=265/L=340 kgs

Electrical/Heat Dissipation:

	DOMESTIC			INTERNATIONAL		
Volts	104 - 127			208 - 254		
Frequency, Hz	59 - 61			49 - 51		
Circuits	1	2	3	^1^	^2^	^3^
Current, Amps	8.7	16.0	11.0	4.4	8.0	5.5
Demand, KVA	1.0	1.9	1.3 (=4.2)	1.0	1.9	1.3 (=4.2)
Input Power, KWatts	.7	1.5	1.1 (=3.3)	.7	1.5	1.1 (=3.3)
Heat Dissipation	12,000 BTU/hr.			3,024 Kcal/hr.		
NEMA Plug	L21-30			L22-20		
Start-Up Current (Amp peak, 3 AC Cycles)	170			170		

Environmental:

	DOMESTIC	INTERNATIONAL
Temperature	59 - 86 °F	15 - 30 °C
Humidity	20 - 80%	20 - 80%
Altitude	12,000 ft	3,700 m

9755 PERIPHERAL CABINET SPECIFICATIONS

Peripheral Cabinet:

Height	53 in	134.6 cm
Width	26.5 in	67.3 cm
Depth	35 in	88.9 cm
Weight (Empty)	280 lbs	120 kgs

Environmental:

Temperature	59 - 86 °F	15 - 30 °C
Relative Humidity	30 - 80%	30 - 80%
Heat Dissipation (Without devices)	286 BTU/hr.	72.07 Kcal/hr.

9955 II

Specifications for the 9955 II system are given below for convenient reference.

System Cabinet:

	DOMESTIC	INTERNATIONAL
Height	53.0 inches	134.6 cm
Width	26.25 inches	66.7 cm
Depth	35.25 inches	89.5 cm
Weight (Fully loaded)	R=584/L=750 lbs	R=265/L=340 kgs

Electrical/Heat Dissipation:

	DOMESTIC			INTERNATIONAL		
Volts	104 - 127			208 - 254		
Frequency, Hz	59-61			49-51		
Circuits	1	2	3	1	2	3
Current, Amps	10.5	16.2	12.4	5.7	8.1	6.2
Demand, KVA	1.5	1.8	2.0 (=5.3)	1.5	1.8	2.0 (=5.3)
Input Power, Watts	1.1	1.4	1.5 (=4.0)	1.1	1.4	1.5 (=4.0)
Thermal Dissipation	11,000 BTU/hr.			2,772 Kcal/hr.		
NEMA Plug	L21-30			L22-L20		
Start-up Current (Amp peak, 3 cycles)	170			170		

Environmental:

	DOMESTIC	INTERNATIONAL
Temperature	59 - 86 °F	15 - 30 °C
Humidity	20 - 80%	20 - 80%
Altitude	12,000 ft	3,700 m

9955 II PERIPHERAL CABINET SPECIFICATIONS

Peripheral Cabinet:

Height	53 in	134.6 cm
Width	26.5 in	67.3 cm
Depth	35 in	88.9 cm
Weight (Empty)	280 lbs	120 kgs

Environmental:

Temperature	59 - 86 °F	15 - 30 °C
Relative Humidity	30 - 80%	30 - 80%
Heat Dissipation (Without devices)	854 BTU/hr.	215.2 Kcal/hr.

PERIPHERAL DEVICE SPECIFICATIONS

DISK DRIVES

32/64/96MB CARTRIDGE MODULE DISK DRIVES

	DOMESTIC	INTERNATIONAL
Physical:		
Height	10.2 in	25.8 cm
Width	19.0 in	48.1 cm
Depth	30.5 in	77.5 cm
Weight	170.0 lbs	77.3 kgs
Environmental:		
Temperature	50 - 95 °F	10 - 35 °C
Humidity	20 - 80%	20 - 80%
Altitude	6,500 ft	2,000 m
AC Power:		
Voltage, Volts	102-128	191-256
Frequency, Hz	59-60.6	49-50.6
Current, Amps	8.2	4.0
Start-up, Amps/Sec	20/30	7.5/30
Demand, KVA	.98	
Input Power, KW	.95	.95
Heat Dissipation	3240 BTU/hr.	816.5 Kcal/hr.
NEMA Plug	5-15P	

60MB WINCHESTER DISK SPECIFICATIONS

	DOMESTIC	INTERNATIONAL
Physical:		
Height	3.25 in.	8.26 cm
Width	5.75 in.	14.61 cm
Depth	8.0 in.	20.32 cm
Weight	6.0 lbs.	2.7 kgs
Mounting	Mountable using industry-standard mounting holes, with SAE threads No. 6-32UNC-2B x .25 inches deep.	
Environmental		
Temperature	50 - 115 °F	10 - 46 °C
Humidity	10 - 80%	10 - 80%
Altitude	-200 - 7,000 ft.	-60 - 2,000m

Power:

AC Power Requirements - No AC power is required directly by this drive itself.

DC Power Requirements - +12 VDC (+-5%) ripple shall not exceed 240mV peak-to-peak.

+5 VDC (+-5%) ripple shall not exceed 100mV peak-to-peak.

Power Consumption:

Current - (+12 Volts)	
Idle	2.1 Amp avg.
Seeking	3.1 Amp avg.
All times	4.25 Amp Peak
Current - (+5 Volts)	
Idle, Amps	0.9 avg.
Seeking, Amps	0.9 avg.
Running, Amps	0.9 Peak

Power Dissipation:

Idle (28W)	96 BTU/hr.	24.2 Kcal/hr.
Positioning (38W)	130 BTU/hr.	32.8 KCal/hr.

120MB WINCHESTER DISK SPECIFICATIONS

	DOMESTIC	INTERNATIONAL
Physical:		
Height	3.25 in.	8.26cm
Width	5.75 in.	14.61cm
Depth	8.00 in.	20.32cm
Weight	6.0 lbs.	2.7kgs
Environmental:		
Temperature	50 - 122 F	10 - 50 C
Humidity	10 - 90%	10 - 90%
Altitude	-200 - 10,000 ft	-60% - 3,000m

Power:

AC Power Requirements - No AC power is required directly by this drive itself.

DC Power Requirements - +12 VDC (+-5%) ripple shall not exceed 240mV peak-to-peak.

+5 VDC (+-5%) ripple shall not exceed 100mV peak-to-peak.

Power Consumption:

Current - (+12 volts)		
Idle	2.1	Amp average
Seeking	3.1	Amp average
All Times	4.25	Amp Peak
Current - (+5 volts)		
Idle	0.9	Amp average
Seeking	0.9	Amp average
Running	0.9	Amp Peak

Power Dissipation

Idle (29W)	99 BTU/hr.	24.9 Kcal/hr.
Positioning (35W)	119 BTU/hr.	30.0 Kcal/hr.

68/158MB DISK DRIVE

	DOMESTIC	INTERNATIONAL
Physical:		
Height	7.0 in	18.0 cm
Width	18.0 in	46.0 cm
Depth	20.0 in	51.0 cm
Weight	64.0 lbs	28.0 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 40 °C
Humidity	8 - 80%	8 - 80%
Altitiude	7,000 ft	2,100 m
AC Power:		
Voltage, Volts	108 - 132	198 - 264
Frequency, Hz	57 - 63	47 - 53
Current, Amps	3.8	
Start-up, Amps/Sec	15/90	
Demand, KVA	.46	
Input Power, KW	.35	
Heat Dissipation	1200 BTU/hr.	302.4 Kcal/hr.
NEMA Plug	5-15P	

80MB DISK DRIVE

Physical

	DOMESTIC	INTERNATIONAL
Height	34.0 in	86.3 cm
Width	19.0 in	48.2 cm

Environmental:

Temperature	59 - 104 °F	15 - 40 °C
Humidity	20 - 80%	20 - 80%
Altitude	6,500 ft	2,000 m

AC Power:

Voltage, Volts	102 - 132	187 - 264
Frequency, Hz	59 - 60.5	49 - 50.5
Current, Amps	8.2	5.0
Start-up, Amps/Sec	30/13	15/10
Demand, KVA	.984	
Input Power, KW	.757	.900
Heat Dissipation	2600 BTU/hr.	655.2 Kcal/hr.
NEMA Plug	5-15P	

160MB DISK DRIVE

	DOMESTIC	INTERNATIONAL
Physical:		
Height	10.2 in	25.9 cm
Width	19.0 in	48.3 cm
Depth	30.1 in	76.5 cm
Weight	125.0 lbs	56.7 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 40 °C
Humidity	20 - 80%	20 - 80%
Altitude	6,500 ft	2,000 m
AC Power:		
Voltage, Volts	102 - 128	195 - 257
Frequency, Hz	59 - 60.6	49 - 50.6
Current, Amps	5.2	2.7
Start-up, Amps/Sec	23/7	14/7
Demand, KVA	.62	
Input Power, KW	.52	
Heat Dissipation	1770 BTU/hr.	446.0 Kcal/hr.
NEMA Plug	5-15P	

300MB DISK DRIVE

	DOMESTIC	INTERNATIONAL
Physical		
Height	36.0 in	91.4 cm
Width	23.0 in	58.4 cm
Depth	36.0 in	91.4 cm
Weight	550.0 lbs	250.0 kgs
Environmental		
Temperature	59 - 90 F	15 - 32 C
Relative Humidity	20 - 80%	20 - 80%
Altitude	6,500 ft	2,000 m
AC Power:		
Voltage, Volts	179 - 245	195 - 257
Frequency, Hz	59 - 60.6	49 - 50.6
Current, Amps	8.0	9.5
Start-up, Amps/Sec	40/10	40/8
Demand, KVA	1.7	
Input Power, KW	1.2	1.3
Heat Dissipation	4200 BTU/hr.	1058.4 Kcal/hr.
NEMA Plug	L6-20P	

315MB DISK DRIVE

	DOMESTIC	INTERNATIONAL
Physical:		
Height	10.5 in	26.7 cm
Width	19.0 in	48.3 cm
Depth	30.0 in	76.2 cm
Weight	115 lbs	52.3 kgs
Environmental:		
Temperature	50 - 104 F	10 - 40 C
Relative Humidity	20 - 80%	20 - 80%
Altitude	10,000 ft	3,000 m
AC Power:		
Voltage, Volts	98 - 126	170 - 264
Frequency, Hz	59 - 60.6	49 - 50.6
Current, Amps	6	3
Start-up, Amps/Sec	16/12	11/12
Demand, KVA	.72	
Input Power, KW	.55	
Heat Dissipation	1800 BTU/hr.	453.6 Kcal/hr.
NEMA Plug	5-15P	

496MB DISK DRIVE

	DOMESTIC	INTERNATIONAL
Physical:		
Height	10.2 in	25.9 cm
Width	8.5 in	21.6 cm
Depth	30.0 in	76.2 cm
Weight	82.0 lbs	37.2 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 45 °C
Humidity	20 - 80%	20 - 80%
Altitude	-983ft - 10,000ft	-300m - 3,000m
AC Power:		
Voltage, Volts	87 - 128	179 - 256
Frequency, Hz	48 - 62	48 - 62
Current, Amps	3.4	2.1
Start-up, Amps/Sec	8/14	6/14
Input Power, KW	.260	.252
Heat Dissipation	886 BTU/hr.	216.7 Kcal/hr.

675MB DISK DRIVE

Physical:		
Height	36.2 in	91.9 cm
Width	23.0 in	58.4 cm
Depth	35.0 in	90.9 cm
Weight	635.0 lbs	289.0 kgs
Environmental:		
Temperature	50 - 95 °F	10 - 35 °C
Humidity	20 - 80%	20 - 80%
Altitude	6,500 ft	2,000 m
AC Power:		
Voltage, Volts	179 - 246	198 - 257
Frequency, Hz	59 - 60.6	49 - 50.5
Current, Amps	7.3	6.8
Start-up, Amps/Sec	40/8	
Demand, KVA	1.63	1.64
Input Power, KW	1.39	1.39
Heat Dissipation	4740 BTU/hr.	1194.5 Kcal/hr.
NEMA Plug	L6-20P	

TAPE DRIVES

STREAMING MAGNETIC TAPE DRIVE

	DOMESTIC	INTERNATIONAL
Physical:		
Height	9.0 in	22.9 cm
Width	19.0 in	48.3 cm
Depth	22.0 in	55.9 cm
Weight	80.0 lbs	36.4 kgs
Environmental:		
Temperature	50 - 95 °F	10 - 35 °C
Humidity	30 - 70%	30 - 70%
Altitude	10,000 ft	3,000 m
AC Power:		
Voltage, Volts	102 - 132	187 - 253
Frequency, Hz	48 - 61	48 - 61
Current, Amps	3.0	1.5
Demand, KVA	.36	
Input Power, KW	.30	
Heat Dissipation	950 BTU/hr.	239.4 Kcal/hr.
NEMA Plug	5-15P	

452X TAPE DRIVE

Physical:		
Height	24.5 in	62.2 cm
Width	19.0 in	48.3 cm
Depth	21.6 in	54.9 cm
Weight	150.0 lbs	68.0 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 40 °C
Humidity	30 - 70%	30 - 70%
Altitude	5,000 ft	1,500 m
AC Power:		
Voltage, Volts	115	220-240
Frequency, Hz	60	50
Current, Amps	5	
Demand, KVA	.80	
Input Power, KW	.35	
Heat Dissipation	1200 BTU/hr.	302.4 Kcal/hr.
NEMA Plug	5-15P	

4551 GCR TAPE DRIVE

	DOMESTIC	INTERNATIONAL
Physical:		
Height	35.0 in	88.9 cm
Width	19.0 in	48.3 cm
Depth	22.5 in	57.2 cm
Weight	400.0 lbs	181.9 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 40 °C
Humidity	30 - 70%	30 - 70%
Altitude	7,000 ft	2,100 m
AC Power:		
Voltage, Volts	108 - 137	180 - 275
Frequency, Hz	47 - 63	47 - 63
Current, Amps	14	
Demand, KVA	1.80	
Input Power, KW	1.44	
Heat Dissipation	4500 BTU/hr.	1134 Kcal/hr.
NEMA Plug	5-15P	

4585 TABLETOP 60MB CARTRIDGE TAPE SUBSYSTEM

	DOMESTIC	INTERNATIONAL
Physical:		
Height	7.0 in	18 cm
Width	3.88 in	10 cm
Depth	15.6 in	40 cm
Weight	11.5 lbs	5.2 kgs
Environmental:		
Temperature	o o	o o
Operational	41 - 113 F	5 - 45 C
Storage	22 - 140 F	-30 - 60 C
Relative Humidity		
Operational	20 - 80%	20 - 80%
Storage	0 - 90%	0 - 90%
Altitude		
Operational	15,000 ft	4,572 m
Storage	50,000 ft	15,240 m
AC Power:		
Voltage, Volts	102 - 132	187 - 242
Frequency, Hz	47 - 63	47 - 63
Current, Amps	.5	.25
Demand, KVA	.060	.060
Heat Dissipation	1200 BTU/hr.	302.4 Kcal/hr.
Demand, KVA	.060	.060
Input Power, KW	.044	.060
Heat Dissipation	150 BTU/hr.	37.8 Kcal/hr.
Power Cord Length	14 ft.	4.3 m

4590 GCR TAPE DRIVE

	DOMESTIC	INTERNATIONAL
Physical:		
Height	24.5 in	62.25 cm
Width	19.0 in	48.25 cm
Depth	15.0 in	38.1 cm
Weight	137.0 lbs	62.15 kgs
Environmental:		
Temperature	° °	° °
Operating	40 - 110 F	5 - 43 C
Storage	-50 - 160 F	-45 - 70 C
Humidity		
Operating	30 - 80%	30 - 80%
Storage	5 - 95%	5 - 95%
Altitude		
Operating	8,000 ft	2,440 m
Storage	50,000 ft	15,250 m
AC Power:		
Voltage, Volts	98-126	196-253
Frequency, Hz	47-63	47-63
Current, Amps	3.7	1.85
Heat Dissipation	1500 BTU/hr.	378 Kcal/hr.

PRINTERS

3115 TELEPRINTER

	DOMESTIC	INTERNATIONAL
Physical:		
Height	5.5 in	14.0 cm
Width	22.1 in	56.0 cm
Depth	18.5 in	47.0 cm
Weight	22.0 lbs	10.0 kgs
Environmental:		
Temperature	50 - 100 F	10- 40 C
Humidity	20 - 80%	20 - 80%
Altitude	12,000 ft	3,700 m
AC Power:		
Voltage, Volts	98 - 129	198 - 264
Frequency, Hz	48 - 65	48 - 65
Current, Amps	.4	
Demand, KVA	.050	
Input Power, KW	.040	
Heat Dissipation	140 BTU/hr.	35.28 Kcal/hr.
NEMA Plug	5-15P	

3166

	DOMESTIC	INTERNATIONAL
Physical:		
Height	42.0 in	106.7 cm
Width	36.5 in	92.7 cm
Depth	39.0 in	99.0 cm
Weight	570.0 lbs	258.5 cm
Environmental:		
Temperature	50 - 95 F	10 - 35 C
Humidity	40 - 70%	40 - 70%
Altitude	5,000 ft	1,500 m
AC Power:		
Voltage, Volts	103.5 - 119.5	180 - 253
Frequency, Hz	59 - 61	49 - 51
Current, Amps	6.0	3.0
Start-up, Amps/Sec	15/.2	10/.2
Demand, KVA	1.00	
Input Power, KW	.800	
Heat Dissipation	2700 BTU/hr.	680.4 Kcal/hr.
NEMA Plug	5-15P	

3173

	DOMESTIC	INTERNATIONAL
Physical:		
Height	16.5 in	41.9 cm
Stand	46.5 in	118.1 cm
Width	30.0 in	76.2 cm
Depth	24.5 in	62.2 cm
Weight	185.0 lbs	84.0 kgs
Environmental:		
Temperature	50 - 90 °F	10 -38 °C
Humidity	30 - 70%	30 - 70%
Altitude	7,500 ft	2,900 m
AC Power:		
Voltage, Volts	93.5 - 132	187 - 264
Frequency, Hz	58 - 62	48 - 52
Current, Amps	8.3	
Demand, KVA	1.00	
Input Power, KW	.800	
Heat Dissipation	2750	693
NEMA Plug	5-15P	

3185 LETTER QUALITY PRINTER

Physical:		
Height	6.6 in	16.8 cm
Width	23.2 in	60.0 cm
Depth	14.3 in	37.7 kgs
Weight	37.0 lbs	16.7 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 38 °C
Humidity	30 - 70%	30 - 70%
Altitude	5,000 ft	1,500 m
AC Power:		
Voltage, Volts	95 - 132	190 - 264
Frequency, Hz	49 - 63	49 - 63
Current, Amps	1.5	
Demand, KVA	.19	
Input Power, KW	.150	
Heat Dissipation	520 BTU/hr.	131.0 Kcal/hr.
NEMA Plug	5-15P	

3320

	DOMESTIC	INTERNATIONAL
Physical:		
Height	43.5 in	110.5 cm
Width	30.3 in	77.0 cm
Depth	25.0 in	63.5 cm
Weight	185.0 lbs	84.0 kgs
Environmental:		
Temperature	50 - 100 °F	10 - 38 °C
Humidity	30 - 70%	30 - 70%
Altitude	5,000 ft	1,500 m
AC Power:		
Voltage, Volts	90 - 132	180 - 250
Frequency, Hz	58 - 62	48 - 52
Current, Amps	4.6	
Demand, KVA	.500	
Input Power, KW	.400	
Heat Dissipation	1400 BTU/hr.	352.8 Kcal/hr.
NEMA Plug	5-15P	

3330

Physical:		
Height	44.5 in	113.0 cm
Width	34.3 in	87.0 cm
Depth	29.7 in	75.5 cm
Weight	350.0 lbs	160.0 kgs
Environmental:		
Temperature	50 - 100 °F	10 - 38 °C
Humidity	30 - 70%	30 - 70%
Altitude	5,000 ft	1,500 m
AC Power:		
Voltage, Volts	90 - 132	180 - 250
Frequency, Hz	58 - 62	48 - 52
Current, Amps	4.6	
Demand, KVA	.500	
Input Power, KW	.400	
Heat Dissipation	1400 BTU/hr.	352.8 Kcal/hr.
NEMA Plug	5-15P	

3350 SERIAL MATRIX PRINTER

	DOMESTIC	INTERNATIONAL
Physical:		
Height	8.7 in	22.1 cm
Width	25.5 in	64.0 cm
Depth	27.0 in	68.6 cm
Weight	69.0 lbs	31.4 kgs
Environmental:		
Temperature	50 - 100 °F	10 - 38 °C
Humidity	30 - 70%	30 - 70%
Altitude	10,000 ft	3,000 m
AC Power:		
Voltage, Volts	90 - 132	187 - 264
Frequency, Hz	58 - 62	48 - 52
Current, Amps	2.1	
Demand, KVA	.250	
Input Power, KW	.200	
Heat Dissipation	700 BTU/hr.	176.4 Kcal/hr.
NEMA Plug	5-15P	

3159 CARD READER

	DOMESTIC	INTERNATIONAL
Physical:		
Height	11.0 in	27.9 cm
Width	19.3 in	48.9 cm
Depth	14.0 in	35.5 cm
Weight	60.0 lbs	27.3 kgs
Environmental:		
Temperature	50 - 104 F	10 - 40 C
Humidity	30 - 90%	30 - 90%
Altitude	6,000 ft	1,800 m
AC Power:		
Voltage, Volts	103.5 - 126.5	207 - 253
Frequency, Hz	58 - 62	48 - 52
Current, Amps	5.5	
Start-up, Amps/Sec	12/3	
Demand, KVA	.650	
Input Power, KW	.525	
Heat Dissipation	1800 BTU/hr.	453.6 Kcal/hr.
NEMA Plug	5-15P	

TERMINALS

PT200

	DOMESTIC	INTERNATIONAL
Physical:		
Height		
Display	15.0 in	38.1 cm
Keyboard	1.5 in	3.8 cm
Width		
Display	15.0 in	38.1 cm
Keyboard	19.5 in	49.5 cm
Depth		
Display	16.0 in	40.6 cm
Keyboard	7.5 in	19.1 cm
Weight		
Display	27.0 lbs	12.3 kgs
Keyboard	7.0 lbs	3.2 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 40 °C
Humidity	10 - 90%	10 - 90%
Altitude	8,000 ft	2,400 m
AC Power:		
Voltage, Volts	90 - 132	180 - 264
Frequency, Hz	47 - 63	47 - 63
Current, Amps	.59	.30
Start-up (amps/sec)	9/.05	9/.05
Demand, KVA	.07	.07
Input Power, KW	.04	.04
Heat Dissipation	140 BTU/hr.	35.28 Kcal/hr.
NEMA Plug	5-15P	

PT200C

	DOMESTIC	INTERNATIONAL
Physical:		
Height		
Display	15.0 in	38.1 cm
Keyboard	1.5 in	3.8 cm
Width		
Display	15.0 in	38.1 cm
Keyboard	19.5 in	49.5 cm
Depth		
Display	17.0 in	43.2 cm
Keyboard	7.5 in	19.1 cm
Weight		
Display	30.0 lbs	13.6 kgs
Keyboard	7.0 lbs	3.2 kgs
Environmental:		
Temperature	50 - 104 °F	10 - 40 °C
Humidity	10 - 90%	10 - 90%
Altitude	8,000 ft	2,400 m
AC Power:		
Voltage, Volts	90 - 132	180 - 264
Frequency, Hz	47 - 63	47 - 63
Current, Amps	1.25	.745
Demand, KVA	.150	.179
Input Power, KW	.09	.09
Heat Dissipation	310 BTU/hr.	78.12 Kcal/hr.
NEMA Plug	5-15P	

POWER LINE CONDITIONERS

LINE CONDITIONER (2 KVA, 115V)

	DOMESTIC	INTERNATIONAL
Physical:		
Height	8.12 in	20.6 cm
Width	9.00 in	22.9 cm
Depth	17.9 in	45.5 cm
Weight	71.0 lbs	32.2 kgs
Environmental:		
Temperature	32 - 122 F	0 - 50 C
Humidity	20 - 95%	20 - 95%
Altitude	10,000 ft	3,000 m
AC Power:		
Voltage	Input: 120V tapped at 108V, 100V Output: 120V	
Frequency	50/60Hz	
Current, Amps	16.0	
Inrush Current	240 A 1/2 cycle	
Load Power Factor	0.3 leading to 0.3 lagging	
Power Rating, KVA	2.0	
Efficiency	>95% at rated load	
Input Connector	9ft shielded power cord w/5-20P plug	
Output Connector	One 5-20R duplex receptacle One 5-15R duplex receptacle	

LINE CONDITIONER (2 KVA, 240 V)

	DOMESTIC	INTERNATIONAL
Physical:		
Height	8.12 in	20.6 cm
Width	9.00 in	22.9 cm
Depth	17.9 in	45.5 cm
Weight	71.0 lbs	32.2 kgs
Environmental:		
Temperature	32 - 122 °F	0 - 50 °C
Humidity	20 - 95%	20 - 95%
Altitude	10,000 ft	3,000 m
AC Power:		
Voltage	Input: 240V tapped at 228V, 220V, 216V, 208V, 200V. Output: 240V tapped at 234V, 228V.	
Frequency	50/60Hz	
Current, Amps	8.3	
Inrush Current	120 A 1/2 cycle	
Load Power Factor	0.3 leading to 0.3 lagging	
Power Rating, KVA	2.0	
Efficiency	>95% at rated load	
Input Connector	9ft shielded power cord w/SCHUKO CEE 7-7 plug, model 1700.	
Output Connector	Four single SCHUKO model 1601 sockets.	

LINE CONDITIONER (2.8 KVA, 240V)

	DOMESTIC	INTERNATIONAL
Physical:		
Height	10.5 in	26.7 cm
Width	10.3 in	26.2 cm
Depth	18.0 in	45.7 cm
Weight	96.0 lbs	43.5 kgs
Environmental:		
Temperature	32 - 122 °F	0 - 50 °C
Humidity	20 - 95%	20 - 95%
Altitude	10,000 ft	3,000 m
AC Power:		
Voltage Input:	240V tapped at 228V, 220V, 216V, 208V, 200V.	
Voltage Output:	240V tapped at 234V, 228V.	
Frequency	50/60Hz	
Current, Amps	12.0	
Inrush Current	230 A 1/2 cycle	
Load Power Factor	0.3 leading to 0.3 lagging	
Power Rating, KVA	2.8	
Efficiency	>97% at rated load	
Input Connector	9 ft power cord with SCHUKO CEE 7-7 plug, model 1700	
Output Connector	Four single SCHUKO CEE 7-4 receptacles	

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